Engaging spaces:
Innovative learning environments, pedagogies and student engagement in the middle years of school.

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B Ag Sci., Grad Dip Ed.

Submitted in total fulfilment of the requirements of the degree of
Doctor of Philosophy

July 2011

Faculty of Architecture, Building and Planning
The University of Melbourne

Produced on archival quality paper
Abstract

This interdisciplinary research project was conducted as part of an Australian Research Council Linkage project entitled *Smart Green Schools*. Calling principally on the disciplines of architecture, education and human geography, it investigates the relationships between innovative middle years’ learning environments, pedagogies and student engagement (Fredricks, Blumenfeld & Paris, 2004). The study is contextualized within current discourses about the influence of globalisation on education provision (Monahan, 2005), the construction of innovative building typologies for education (Burke & Grosvenor, 2008; Dudek, 2008) and middle years’ education reform (Pendergast & Bahr, 2005; Carrington, 2006).

In the pursuit of new knowledge about how middle years’ learning environments may be designed and used to support contemporary approaches to teaching and learning, field-based qualitative research was conducted across three case study sites using multiple case study (Bryman, 2004), ethnographic (Hammersley, 1999) and participatory action research (Cohen, Manion & Morrison, 2007; Mattsson & Kemmis, 2007) methodologies. Data were collected using a variety of social research methods including participant observation (Cohen, Manion, & Morrison, 2007), semi-structured interviews (Kvale, 1996) and focus group forums (Cohen, Manion, & Morrison, 2007). In addition, two design workshops were conducted. This data was analysed using a process of thematic narrative analysis (Riessman, 2008).

Using a range of theoretical frameworks to interpret and discuss the data collected, the study initially investigated why schools wished to develop new socio-spatial contexts for learning and the processes by which they pursued these objectives. Later, the study focused on how pedagogical objectives influenced the design of the built environment and how the built environment subsequently influenced pedagogies. In evaluating the effectiveness of the changes made, the influence of new socio-spatial contexts for learning on student engagement was explored.

The findings of the study indicated that the effectiveness of innovative learning environments was a product of how well the environment aligned with particular pedagogies, curricula, assessment practices, and social factors. Furthermore, effectiveness was associated with how well the environment supported a range of complex interactions (Law & Urry, 2004; Heylighten, Cuillers & Gershenson, 2007). Innovative learning environments functioned best when students were able to take ownership of their learning, work with some autonomy and interact directly and indirectly with peers, teachers, technologies and the physical environment.
Regarding student engagement (Fredricks, Blumenfeld & Paris, 2004), a new sub-type of this construct - ‘geographical engagement’ - was found to be associated with students’ ownership and mastery of their environment and expressed by students in the ways they socially produce space (Soja, 1989; Lefebvre, 1991) to support their learning activities and by their ability to engage in learning with some autonomy.

In response to current discourse about flexible learning environments (Woodman, 2011), it is suggested that reflexive, not flexible, learning environments are needed, as the utility of flexible spaces is limited by the environmental competencies of users. While flexibility suggests that spaces may respond to the needs of inhabitants, it suggests nothing about the role that space can play in informing teachers and students about how they might engage in particular learning activities. Reflexive spaces, on the other hand, suggest to users how they might participate in learning activities and enable them to fine tune learning settings to suit their pedagogical needs.

In conclusion, it is suggested that not only can well designed innovative learning environments support middle years’ reform agendas, but that middle years’ reform agendas need to address changes to the built environment.
Declaration

This is to certify that:

(i) The thesis comprises only my original work towards the PhD except where indicated in the Preface,

(ii) Due acknowledgement has been made in the text to all other material used,

(iii) The thesis is fewer than 100,000 words in length, exclusive of tables, maps, bibliographies and appendices.

_______________________
Benjamin William Cleveland
Preface

The following conference papers presented material from this research:


The following peer-reviewed journal articles presented material from this research:


Cleveland, B. (2008). Rethinking middle school building design to support progressive educational pedagogies. Critical and Creative Thinking, 16(1), 59-77.

The following report presented material from this research:

Cleveland, B. (2010). The role of space in creating new socio-spatial contexts for learning, 15-16. In Smart Green Schools the unofficial overview.
Acknowledgements

This research was funded by the Australian Government through the Australian Research Council Linkage Grant Scheme. The Chief Investigators of the grant entitled *Smart Green Schools* were Clare Newton, Dr Sue Wilks, Dr Kenn Fisher, Dr Dominique Hes and Professor Kim Dovey. Respectively, they come from the diverse fields of architecture, education, education planning, sustainability and urban design. The Industry Partners were the Victorian Department of Education and Early Childhood Development, the Victorian Government Architects Office, Rubida Research, Mary Featherston Design, Hayball, H2o Architects, McGauran Giannini Soon Architects, McBride Charles Ryan Architects and SBE Melbourne. Ken Woodman, an architect, and I received postgraduate scholarships to complete PhDs as part of the project.

There are a number of people I wish to thank personally for assisting and supporting my work on this PhD. I will be eternally grateful for the advice and guidance of my principal supervisor Dr Sue Wilks. In equal measure, she provided both encouragement and critical evaluation of my work throughout the duration of this project. Without Sue’s assistance the iterative process that led to this dissertation would not have been possible. In particular, I wish to thank her for teaching me how to conduct and report qualitative research. I am also thankful for the advice of my second supervisor, Clare Newton. Her architectural perspective was instrumental in maintaining the interdisciplinary nature of the research and her involvement in the research process and her feedback on my progress was invaluable.

I am indebted to Dr Kenn Fisher, Dr Dominique Hes and Dr Kim Dovey for their assistance in formulating the direction of the research and for their feedback. Their insights regarding the theoretical frameworks which informed the design of the study and the analysis the field-data were of great assistance. I am also indebted to Dr Ruth Beilin for her advice regarding the methodologies and methods that were employed in the study.

The constructivist process through which this project was developed was supported by many people. Of these, I wish to thank a few in particular: my fellow PhD candidate Ken Woodman for the long conversations we had about learning and space and the convergence of both, as well as Mary Featherston and Richard Leonard (both industry partners), who shared their insights into school design and construction with me.

This project would not have been possible without the willing participation of school leaders, teachers and students. I am especially thankful to the three school principals who volunteered the participation of their schools. The fieldwork phase of the study was not only productive and
informative but also enjoyable due to the active participation of those involved in the case study schools.

I wish to thank both my parents for discussing issues about schooling and education with me for many years (both were teachers) and I am specifically thankful to my father, Bill, for proof-reading this dissertation. Finally, I wish to thank my loving wife Bella and our son Raphael (who was born during my candidacy) for being my best supporters.
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Definition of terms for the purposes of this study

Affordance – the quality of an environment that will allow a person to perform an action (Gibson, 1977).

Architectural programming – “the time in which the relevant values of the client, user, architect, and society are identified; important project goals are articulated; facts about the project are uncovered; and facility needs are made explicit” (Hershberger, 2002, p. 292).

Constructivist pedagogies – teaching and learning practices in which students form knowledge and conceptual understandings through play, experimentation and collaboration, as opposed to learning via direct teacher-led instruction (Stommen & Lincoln, 1992).

Critical spatial analysis – the analysis of space through the lens of critical social theory (Fisher, 2002).

Dialogic learning – learning that arises from dialogue between people and leads to actions that promote understanding, cultural creation, and liberation (Friere, 1970).

Emancipatory praxis – logical action based on reflection during periods of change; associated with liberation from a situation (Habermas, 1971).

Flexible spaces – built environments that accommodate short term changes to enable areas to be varied from day to day to suit activities (DCFS, 2007).

ICT – information and communication technologies such as computers and other internet enabled devices.

Instructivist pedagogies – teaching and learning practices in which teachers provide students with information and students passively receive this information and try to assimilate it with what they already know without the opportunity for discussion.

Learning environments – built environments that are designed as places for learning; inclusive of building structures, furniture, fixtures, technologies and resource objects.
Metacognition – thinking about thinking, knowing about knowing, or cognition about cognition (Metcalfe & Shimamura, 1994)

Pedagogies – practices, strategies, or styles of instruction engaged in by teachers and students.

Reflexive spaces – built environments that suggest to users how they might participate in learning activities and enable them to fine tune learning settings to suit their pedagogical needs.

Socio-pedagogical cultures – learning cultures associated with particular social and pedagogical practices.

Socio-spatial contexts – situations arising from the interaction between particular social settings and spatial environments.

Space – a construct that is composed of both physical and social components. Space has a physical context, characterised by geometry, and a social context derived from socially constructed meanings (Soja, 1989).

Spatiality – “the created space of social organisation and production” (Soja, 1989, p 79), or “the production of space through the interaction of the physical and the social” (McGregor, 2004a, p. 2).

Spatio-pedagogical projects – projects involving both the construction of new built environments and the development of new pedagogical practices.

Student engagement – a construct composed of two major facets: engagement of a specific learning nature (engagement in learning) and engagement of a general participatory nature (engagement with school) (Fullarton, 2002). Student engagement is generally thought to be composed of affective (emotional), behavioral, and cognitive dimensions (Fredricks, Blumenfeld & Paris, 2004).
Chapter 1: Introduction

Introduction

The rapid development of information and communication technologies (ICT), the exponential rate of information production and the creation of new social structures brought about by globalization (Monahan, 2005) are all challenging our views on what constitutes important and appropriate schooling for today’s students. In turn, our perspectives on what constitutes world class schooling facilities are also being challenged.

For many years in Australia, pedagogical reform agendas associated with the middle years (Years 5-9) have advocated the adoption of learner-centred education (Barratt, 1998; Hill & Russell, 1999; Beare, 2000; DEET, 2002; Pendergast & Bahr, 2005; Carrington, 2006; DEECD, 2008). However, the reforms that have been called for by academics and state government departments across Australia have not been widely adopted in schools (DEET, 2002; Pendergast, 2006). It seems that schools have had difficulty moving on from past socio-pedagogical cultures to adopt new approaches to teaching and learning that are in keeping with the substantial changes that have occurred in society over the past few decades. Pendergast (2006) reported that reform efforts in Australian schools have been hampered by the changing nature of reform, changes in leadership, refusal by staff to participate or continue to be involved, the breakdown in teacher-teams, loss in continuity, momentum and financial commitment, and failure to establish protocols to determine the efficacy of the reform process.

Fisher (2002) suggested that a ‘deep spatial silence’, or ‘unconsciousness’, regarding the power of space and the influence that it has over school organizational structures and learning may have restricted reform efforts, including the adoption of new pedagogies. Innovation in the architectural design of school learning environments may be one interventionist strategy with the potential to catalyze sustainable pedagogical reform. Altering the spaces and spatiality of schools – “the created space of social organisation and production” (Soja, 1989, p 79) – may support whole school reforms that will change what Elmore (1996, p. 3) described as the “fundamental conditions of teaching and learning for students and teachers”.

This research project was conducted as part of an Australian Research Council Linkage project entitled Smart Green Schools. It investigates the relationships between innovative middle years’ learning environments, pedagogies and student engagement (Fredricks, Blumenfeld & Paris, 2004) in the pursuit of new knowledge about how middle years’ learning environments may be
designed and used to support contemporary approaches to teaching and learning. The study was conducted based on the assumption that good design for the construction of new schools and for the refurbishment of existing schools is of vital importance if current and future generations are to be successfully educated. The research was supported by a multidisciplinary team of academics led by Chief Investigator Clare Newton (architecture). This team included Dr Sue Wilks (education), Dr Dominique Hes (sustainability), Dr Kenn Fisher (education planning) and Professor Kim Dovey (urban design). The study was also supported by Dr Ruth Beilin (landscape sociology), PhD candidate Ken Woodman (Smart Green Schools) and Industry Partners: the Victorian Department of Education and Early Childhood Development, the Victorian Government Architects Office, Rubida Research, Mary Featherston Design, Hayball Architects, H2o Architects, McGauran Giannini Soon Architects, McBride Charles Ryan Architects and SBE Melbourne.

Background to the study

Problem statement

Concern about educating today’s students in traditional classrooms was expressed by academics with an interest in school design and pedagogy (Fisher, 2002; Upitis, 2004; McGregor, 2004a; 2004b; 2004c). Such questioning appeared necessary when the pedagogical intent was to involve students in activities that involved communication and collaboration (Vygotsky, 1986), higher order thinking (Bloom et al., 1956) and learning that addressed Multiple Intelligences (Gardner, 1993; 1999).

Traditional classrooms, conceived during the Industrial Revolution and designed for students to passively receive information (McGregor, 2004b), were viewed as restricting students from acquiring new knowledge and understandings via a range of information sources, learning modalities (Gardner, 1993; 1999), experiential activities (Dewey, 1966) and authentic tasks (Newman et al., 1996). In addition, traditional classrooms were thought to be limiting options for the integration of educationally supportive technologies (Thompson, 2005).

Further research was needed to inform architects and educators about how to design and use learning environments to meet contemporary pedagogical objectives and support student learning aligned with the needs of modern society (Weinstein, 1979; Clarke, 2001; Edwards & Clarke, 2002; Fisher, 2004; Heppell et al., 2004; McGregor, 2004a; 2004b; 2004c; Upitis, 2004; Heartnell-Young, 2006; Wall, Dockrell & Peacey, 2008; Wheeler, 2008, Taylor, 2009).
Justification for the research

Middle years’ education

Recent moves towards learner-centred education models in Australian schools have been influenced by research findings and government policies that have advocated the need for holistic reform in the middle years (Barratt, 1998; DEET, 1999; Hill & Russell, 1999; Beare, 2000; DEET, 2002; Pendergast & Bahr, 2005; Carrington, 2006; DET, 2006; DEET, 2007; DEECD, 2008; DEECD, 2010; DECS, 2010). Examples of the types of reforms advocated include those proposed by the Middle Years Research and Development (MYRAD) Project (DEET, 2002). This report recommended the implementation of a range of constructivist pedagogies designed to support higher levels of student engagement. Stommen and Lincoln (1992) described constructivist pedagogies as teaching and learning practices that enable students to form new knowledge and conceptual understandings through play, experimentation and collaboration, as opposed to learning via direct teacher-led instruction. Specifically, the MYRAD report recommended:

- Strengthening teacher-student relationships; involving students in decision-making about content, process and assessment; presenting authentic tasks that require complex thought and allowing time for exploration; inclusion of processes involving co-operation, communication, negotiation and social competencies generally; and providing for individual differences in interest, achievement and learning styles (DEET, 2002, p. web).

The difficulties that many schools appear to encounter when trying to implement such reforms may, in part, be due to the existence of powerful pervading cultures which act to maintain the status quo and negate systemic change. Try as they might, schools seem to be finding processes of holistic change challenging. In the forward to Breakthrough, Elmore commented:

- The default culture [of schools] stretches, seemingly to a breaking (tipping) point, and then it snaps back to where it was. The best ideas of reformers have, as yet, proven no match for the inertia of a powerful resident culture (Fullan et al., 2007, p. xi).

This study investigates how changes to the physical nature of schools may influence the ‘resident cultures’ in schools and the ability of school communities to engage in holistic reform.

School learning environments

Across Australia and much of the western world the physical learning environments in schools are currently undergoing a process of transformation (OECD, 2009). Through this process the
spaces in which students attend school are being rethought and redesigned. Although there is a
global movement towards creating resource-rich buildings that are intended to support innovative
approaches to teaching and learning (Burke & Grosvenor, 2008; Dudek, 2008), little is known
about the actual effectiveness of these facilities in terms of their ability to support contemporary
constructivist pedagogies and student engagement. Many researchers have recognised a lack of
research in this area and called for more research into the learning/space nexus (Weinstein,
1979; Clark, 2001; Edwards & Clarke, 2002; Upitis, 2004; Heppell et al., 2004; Fisher, 2004;
McGregor, 2004a; 2004b; 2004c; Hartnell-Young, 2006; Wall, Dockrell & Peacey, 2008; Wheeler,

Specifically, Clarke (2001, p. 3) recognised that “discussion concerning education over the past
25 years has tended to ignore the fact that schools are physical entities as well as organisational
units”. McGregor (2004a, p. 2) identified that “there remains a paucity of evidence on the
interaction of people and the built environment of schools”. Upitis (2004, p. 1) contended that
“there is very little research on how space dictates what is learned and how it is learned”. Fisher
(2004, p. 37) suggested that “there has been no sustained attempt at a holistic change to
approaches to educational reform that integrates all the forces acting on it and especially
including the power of space”. Hartnell-Young (2006, p. ‘e-journal’) called for “further research
that crosses the boundaries between teaching and design communities in the pursuit of student
learning. Taylor (2009, p. 3) concluded that “rarely … do authors attempt to
explore the
connections between architectural design and learning theory”.

This study addresses each of these factors. It investigates: schools as physical entities and
organisational units; interactions between students, teachers and the built environment; the
influences of space on student engagement in learning; processes of holistic change in schools;
boundaries between teaching and design communities; and connections between architectural
design and learning theory.

Significance of the research

In addition to addressing the need for academic research, this project addresses an urgent
practical need for current and local knowledge about school design and use. Partners of the
Smart Green Schools project included the Victorian Department of Education and Early
Childhood Development (DEECD), the Victorian Government Architect’s Office, and a number
of local architecture and design firms (see acknowledgements). These partners have an interest in
ensuring that funding for school infrastructure projects is spent effectively and that Australian
children have access to the best possible facilities.
In Australia, the transformation of school infrastructure has been aided by a number of recent government funding schemes, including the Victorian Government’s Building Futures (DET, 2006) and Leading Schools Fund (DEECD, 2009) schemes, and the Australian Government’s Building the Education Revolution (BER) program (DEEWR, 2010). These schemes/programs have provided historically unprecedented levels of funding for both public and private school infrastructure projects.

The BER program, in particular, injected vast sums of money into school building projects. In early 2009, this program began distributing $16.2 billion to schools as part of the nation building economic stimulus package that was initiated in the wake of the 2008 global financial crisis. BER funding was directed towards 24,382 building and infrastructure projects in 9,526 schools nationwide (DEEWR, 2010). With investment on this scale, new school buildings have literally been ‘popping up’ in every neighborhood across the country.

In the state of Victoria, these injections of finance, along with a loosening of the school infrastructure design guidelines, provided an opportunity for innovation in the design of school learning environments. This study, set within the context of middle years’ education reform, investigates the effectiveness of a small sample of these innovative learning environments. It is hoped that the findings of the research will inform architects and educators about how to design and the use of middle years’ learning environments into the future.
Research aim and questions

This study addresses gaps in the existing literature concerning the relationships between innovative middle years’ learning environments, contemporary constructivist pedagogies and student engagement. The following diagram depicts the field of inquiry (see Figure 1).

![Diagram of relationships between pedagogy, socio-spatial context, physical learning environment, student engagement.]

Figure 1. The study’s field of inquiry: the relationships between innovative middle years’ learning environments, contemporary constructivist pedagogies and student engagement.

For the purposes of this study, ‘contemporary constructivist pedagogies’ refers to approaches to teaching and learning where knowledge is discovered and co-created by learners and teachers in a variety of settings. These pedagogies have been derived from the works of educational theorists such as Dewey (1966; 1971), Friere (1970; 1973), Vygotsky (1986), and Gardner (1993; 1999).

To address these gaps in the literature, the study aimed to:

*Gain new knowledge and understandings about how middle years’ learning environments may be designed and used to support contemporary constructivist pedagogies and improve student engagement.*

In the pursuit of this aim, the following research questions were asked:
Key research question:

- How can middle years’ learning environments be designed and used to support contemporary constructivist pedagogies and improve student engagement?

Subsidiary research questions:

- How are contemporary constructivist middle years’ pedagogies influencing the design of learning environments?

- How are innovative middle years’ learning environments influencing pedagogies?

- How are innovative learning environments and contemporary constructivist pedagogies collectively influencing socio-pedagogical cultures in the middle years and what impact is this having on student engagement?

- How can the effectiveness of innovative middle years’ learning environments be assessed for their influence on pedagogical practices and student engagement?

Introduction to the research approach

Historically, researchers have undertaken quantitative studies that link student test scores to the condition of school buildings when investigating connections between learning and space (Fisher, 2004). In a departure from this positivist approach, this study approached researching the learning/space nexus from an interpretivist epistemological position. Informed by critical social theory, this interdisciplinary study married theoretical perspectives from the disciplines of architecture and education to pursue new knowledge and understandings about the relationships between innovative learning environments, pedagogies and student engagement.

This research approach was informed by the Smart Green Schools Partner Investigator Dr Kenn Fisher (2002), who recommended that more qualitative research was needed in order to gain better understandings of how students and teachers experience and use space in the pursuit of learning. He commented:

While a significant amount of research activity has been carried out on the planning, design and management of educational facilities, it has been from a designer’s or manager’s perspective and rarely from a teacher’s, students or pedagogical viewpoint (Fisher, 2002, p. 17).
Using qualitative methods, and incorporating the perspectives of teachers and students, this study evaluates the architectural response in three Victorian schools to a shift in educational practice that embraces constructivist approaches to teaching and learning. Field-based research was conducted at three case study sites (schools) with middle years’ students (Year 5-9) where learning environments were designed to support contemporary constructivist pedagogies. In developing a critical spatial analysis of these middle years’ learning environments, multiple case study (Bryman, 2004), ethnographic (Hammersley, 1999; Bryman, 2004) and participatory action research (Kemmis & McTaggart, 1992; Cohen, Manion & Morrison, 2007; Mattsson & Kemmis, 2007) methodologies were employed. Field data was collected using a variety of social research methods including participant observation (Bryman, 2004; Cohen, Manion, & Morrison, 2007; Gay, Mills & Airasian, 2006), semi-structured interviews (Kvale, 1996), and focus group forums (Bryman, 2004; Cohen, Manion, & Morrison, 2007). In addition, two design workshops were also conducted. This data was analysed using a process of thematic narrative analysis (Riessman, 2008).

The adoption of a case study approach enabled the research questions to be investigated though the eyes of the people directly involved in creating and using innovative learning environments. Data collection at these sites involved fieldwork that explored the socio-spatial settings and socio-pedagogical cultures at the three schools. The field research was primarily concerned with: why and how school communities were creating innovative learning environments; how innovative learning environments were being used pedagogically; and how effective these learning environments were in engaging students—taking into consideration the combined influence of the physical environment and pedagogical practice.

As the significance of space has only recently become acknowledged in education (McGregor, 2004), consideration in this project of perspectives derived from ‘the spatial turn’ in the social sciences (Livingstone, 1995) provided an informative perspective from which to explore the field on inquiry. The project’s methodology and methods are discussed in detail in Chapter 3.

**Scope of the research**

**Practical limitations**

Although school learning environments are changing across the western world (OECD, 2009), the fieldwork for this study was restricted to an investigation of three schools in the greater metropolitan area of Melbourne, Victoria. This decision was informed by the study’s methodologies and methods and the availability of funding and time limits. The research
approach required fieldwork to be conducted regularly at the three case study sites (schools) over a period of two years (see Chapter 4 for details). Because of the wave of innovation in school design across the city, situating the study in Melbourne was considered appropriate.

**Conceptual limitations**

Fisher (2002) suggested that studies into school learning environments should focus on two key ideas: architecture and pedagogy. In examining the relationships between space (architecture) and pedagogy this study also incorporated theories from a number of additional disciplines that Fisher identified as likely to support research into the learning/space nexus. These disciplines included sociology, environmental/ecological psychology, geography and cultural theory. The construct of student engagement (Fredricks, Blumenfeld & Paris, 2004) and theories derived from complexity science (Law & Urry, 2004; Heylighten, Cuillers & Gershenson, 2007) are also introduced as means of examining the influences that space and pedagogy have on student learning.

**Background of the researcher**

My interest in learning environments was framed by my own schooling experience. During both primary and secondary school I attended Preshil, The Margaret Lyttle Memorial School, in Kew, Victoria. This school was often described as ‘progressive’. It comprised a variety of innovative and award winning buildings designed and constructed during the late 1960s and early 1970s (Evans, Borland & Hamann, 2006; Lewi, 2010). Floor plans of a selection of these buildings are shown below (see Figure 2). The school’s architect at the time, Kevin Borland, was awarded the 1972 Royal Australia Institute of Architects (RAIA) Victorian chapter bronze medal for the primary school campus (Goad, 2003; Evans, Borland & Hamann, 2006; Lewi, 2010).
Figure 2. Select buildings designed by Kevin Borland at Preshil during the late 1960s and early 1970s (Evans, Borland & Hamann, 2006, p. 153).

The contrast between the learning environments that I encountered at Preshil as a student and the more traditional learning environments that I later experienced at other schools as a primary and secondary school teacher caused me to reflect on how space could both enable and constrain educational activities and practices.

In 2006 my interest in contemporary learning environments was heightened when, as primary school teacher, I had the opportunity to direct the refurbishment of a primary school science and technology centre. My involvement in this project provided me with insight into how learning environments were changing in response to new technologies and contemporary pedagogies. Working with the architects to design the space and teaching students in the space, both before and after the refurbishment, encouraged me to pursue this research project when the opportunity arose.

With a background in teaching, I came to this project with experience of both the physical and social settings in schools and with a working knowledge of middle years' learning theory. My knowledge of the field of architectural design, however, was limited but supplemented by the multidisciplinary expertise within the broader Smart Green Schools research.
Thesis structure

To answer the research questions and achieve the study's aim, the thesis is structured in the following way:

Chapter 2 reviews the literature about middle years' learning theory and the design of school learning environments. The intention of the chapter is to position the research questions within the field of inquiry and to establish the research gap(s).

Chapter 3 outlines of the epistemology, ontology and theory that informed the design of the research project and discusses the methodology, methods, and data analysis techniques that were employed. This information is intended to provide transparency (Mattsson & Kemmis, 2007) regarding how the research was carried out and on what grounds the findings from the research are claimed.

Chapter 4 details of the physical environments and socio-cultural settings that were encountered during the fieldwork phase of the study. A brief description of how the fieldwork was conducted at each of three case study sites (schools) is given. This information reveals the trustworthiness of the research (Maykut & Morehouse, 1994). It may also assist the reader to determine the transferability (Bryman, 2004) of the findings to other contexts and/or settings.

In Chapters 5 to 7, I present and discuss the findings from the fieldwork phase of the study. Each of these chapters addresses at least one subsidiary research question, and each is informed by a different theoretical framework. A number of theory frameworks were used due to the interdisciplinary and multifaceted nature of the research. The findings that are presented are aggregated from across the case study sites. References to individual sites are made to illustrate particular phenomena.

Chapter 5 details the processes by which new education models and learning environments were developed. It identifies the physical characteristics of the new learning environments. Discussion in the chapter is informed by the literature about critical pedagogy (Freire, 1970; 1973; Giroux 1985).

Chapter 6 details how students and teachers used innovative learning environments to meet their pedagogical needs and discusses how their geographical experiences and pedagogical approaches were influenced by these environments. Discussion in the chapter is informed by the
literature about critical theory of space (Soja, 1989), critical human geography (Lefebvre, 1991; 2008), social meanings of space (Bailey, 1975) and behaviour settings theory (Barker 1968).

Chapter 7 discusses the influences of new socio-spatial contexts on socio-pedagogical cultures and the subsequent influences of both context and culture on student engagement. The literature on complexity theory (Heylighten, Cuillers & Gershenson, 2007) and complex adaptive systems theory (Law & Urry, 2004) informs discussion in the chapter.

Finally, Chapter 8 addresses the key research question: How can middle years’ learning environments be designed and used to support contemporary constructivist pedagogies and improve student engagement? In this chapter, I present and discuss some additional findings before drawing my final conclusions. In drawing these conclusions, I explore the implications of the findings for the design and use of middle years’ learning environments and the reform of middle years’ education. In addition, I reflect on the research process, identify some limitations of the research, and make suggestions for further research.

**Conclusion**

This research followed an iterative process that was framed by multiple case study (Bryman, 2004), ethnographic (Hammersley, 1999, Bryman, 2004) and participatory action research methodologies (Kemmis & McTaggart, 1992; Cohen, Manion & Morrison, 2007; Mattsson & Kemmis, 2007). As a participant in this iterative process, my aim was to take on a catalytic and supportive role in order to help the research participants – school leaders, teachers and students – pursue their spatio-pedagogical objectives. As advised by Mattsson and Kemmis (2007), and to the extent it was realistically possible, I endeavored to avoid overly influencing the direction of the research process. The findings that I present and discuss in later chapters owe much to the participation of the many school leaders, teachers and students who took part in the study and the Smart Green Schools’ research team and partners.
Chapter 2: Literature review

Introduction

In this chapter, relevant literature is reviewed in order to position the research questions within the field of inquiry. Due to the interdisciplinary nature of the research, the literature reviewed here encompasses the disciplines of education, architecture and human geography. In an attempt to bridge the education/architecture divide this review of the literature has been written with the intention of making the discussion of each discipline accessible to both educators and architects/designers.

This chapter is divided into two sections: ‘middle years’ education’ and ‘school space, spatiality and design’. In each section literature is reviewed for the purpose of establishing the context of the study. In addition, this literature is critically analysed to establish the research gap within which this study is situated. Where research gaps have been identified, the intentions of the study are discussed under headings finishing with the suffix ‘the research gap’.

The literature associated with the theoretical lenses that informed the analysis of field data and discussion of the research findings is presented later in chapters 5, 6 and 7.

Middle years’ education

Why the middle years?

The ‘middle years’ refers to a phase of schooling that is situated somewhere between lower primary and upper secondary school. Carrington (2006, p. 103) described this phase of schooling as:

... an educational model that, in its contemporary iteration, is purposely based around constructivist learning theory and a particular view of the developmental needs of early adolescents.

The middle years (nominally Years 5-9 in Victoria) has become a well recognised site for educational research and innovation over the past few decades. This phase of schooling has been a focus for research in systems of education in countries including England, Germany, Italy
and the USA (Hargraves, 1986) and remains a dynamic setting for research within Australia’s broader educational landscape. In Australia, middle years’ education has been undergoing a particularly intense process of review and reform for the past two decades (Carrington, 2006). In 1999, Hill and Russell (p.1) commented:

Some of the more long-standing of the unresolved problems in education are those associated with provision for students in early adolescence. Within the Australian context, there has been a renewed interest in reaching a resolution, particularly in the wake of research findings regarding the prevalence of symptoms including underachievement, disaffection, alienation and disengagement from productive learning among students.

In the two-tiered Australian school system the middle years straddles the primary/secondary school divide. Although a few schools, or more commonly sub-schools, exist as middle school entities that geographically co-locate students in the Years 5-9 bracket, it is typical in Australia for the middle years to be broken by the historically-based organisational structures of primary (Years P-6) and secondary school (Years 7-12).

Making the transition across this geographical and cultural divide has traditionally been characterised for students by a shift from smaller to larger geographic school sites, from intimate relationships with a few teachers to more distant relationships with numerous teachers, and from student-centred to discipline-centred approaches to learning (Pendergast & Bahr, 2005). Students have experienced well-documented difficulties when making the transition between primary and secondary school due to the changes they encounter. In Australia, the identification of the ‘middle years’ was a response to the perceived need to facilitate a more seamless transition between existing schooling structures that were based on earlier notions about age appropriate education (Pendergast & Bahr, 2005).

Through research undertaken in the UK during the mid 1980s, Hargraves (1986) identified tensions and contradictions associated with the ideological conceptions of the middle years and middle schools. He became particularly interested in a situation he described as the unresolved tension between the middle years having a ‘unique identity’ and acting as a ‘zone of transition’. He believed that this tension had led to confusion regarding the role of the middle years within the overall system of school-based education. In Australia, consciousness regarding the issues pertaining to the middle years was raised in the early 1990s, notably by the Report of the Junior Secondary Review (Eyers, Cormack & Barratt, 1992).

Confusion surrounding how to approach the education of middle years’ students remains prevalent in Australian schools, evidenced by the continued project of reform that is continuing around the country. In the forward to Teaching middle years: rethinking curriculum, pedagogy and
assessment (Pendergast & Bahr, 2005), Hardingham suggested that although middle years’ reform was actually accelerating, it was in need of comprehensive research that could steer the reform process in a logical direction. In describing contemporary developments associated with the conceptual framework around the middle years, Pendergast and Bahr (2005) described the middle years as a distinctly identifiable phase of schooling and suggested that the middle years had become more than a passing fad, based on theoretical notions and tentative trials, to become a mature and sustainable educational approach for young people of around 10 to 15 years of age.

The maturing of the middle years’ concept and the actual pedagogical practices that take place for the education of middle years’ students may remain misaligned in many schools. Smyth and McInerney, as late as 2007, described the middle years in Australian schools as a ‘wasteland’, a place in which the needs of young people have continued to be subverted by historically-based norms including subject-based departments, hierarchies of knowledge, teacher directed forms of learning and competitive assessment practices. They identified middle school settings as enormously complex social institutions that are in a constant state of flux and described middle years’ education as being perpetually “tangled with the vibrancy of the aspirations and expectations of young lives which are themselves in a state of turmoil in increasingly dangerous and uncertain times” (Smyth and McInerney, 2007, p. 6).

Carrington (2006) argued that after two decades of middle years’ reform in Australia schools were still struggling to engage students, to improve the overall quality of the education provided and to improve outcomes. She suggested that in recent years a new backdrop for educational reform in the middle years had come into existence, one that was characterised by new forms of information access and methods of communication enabled by digital technologies. She also identified social, economic, political and cultural shifts that had occurred in unison with the pervasive spread of digital technology and concluded that schools are obligated to undertake further reforms based on informed understandings of the life experiences of middle years’ students within contemporary society.

When summing up the middle years’ reforms that had occurred, Pendergast and Bahr (2005) concluded that reform in the middle years in Australia had focussed largely on the convergence and transformation of curriculum, pedagogy and assessment at the expense of greater focus on the organisational elements in schools.
Historical context for contemporary trends in middle years’ education

A driving force behind reform in the middle years has been the influence of the learning theories of prominent figures such as Dewey, Friere, Bloom, Vygotsky, Gardner, Newmann, Bruner, and Beare. Their philosophies and theories led to constructivist approaches to education—teaching and learning approaches where knowledge is discovered and co-created by learners and teachers in a variety of settings. Stommen and Lincoln (1992) described constructivist pedagogies as teaching and learning practices that enable students to form new knowledge and conceptual understandings through play, experimentation and collaboration, as opposed to learning via direct teacher-led instruction. The following paragraphs briefly outline the foundational contributions made by these prominent figures to the field of progressive education and the development of constructivist approaches to teaching and learning.

Dewey’s (1966; 1971) work from the late 1890s and early 1900s established a philosophy of progressive education and introduced ideas about experiential learning and democratic education. He advocated ‘freedom and initiative’ in the classroom rather than ‘guidance and control’ and suggested that students should be able to explore their interests through inquiry. The concept of democratic education, in which students as individuals and as members of small learning communities became the focus of the learning, led to the development of further educational philosophies and tools designed to extend student learning beyond the level requiring only the recital of facts. Dewey (1971) noted, however, that students’ interests were a starting point and not ends in themselves. He commented:

> Interests in reality are but attitudes towards possible experiences; they are not achievements; their worth is in the leverage they afford, not in the accomplishment they represent … Continuous initiation, continuous starting of activities that do not arrive, is, for all practical purposes, as bad as the continual repression of initiative (p. 15-16).

Critical pedagogy (discussed further in Chapter 3) owes its foundation to Friere (1970; 1973). Friere’s work was founded on liberating Brazilian workers from illiterate existences during the 1940s. He advocated that learning should be integral with the daily lives of learners, not founded on the perspectives of the dominant culture. Like Dewey, he promoted democratic education, calling for a breakdown in the traditional didactic teacher-student relationship. He believed in the dialogical nature of learning and called for the development of reciprocal affiliations where all members of a learning community could act as both teacher and learner. Furthermore, he contended that the knowledge and understandings brought to the learning situation by each member of a learning community should be considered important and shared.
Bloom et al. (1956) promoted education that involved students using the skills of analysis, synthesis and evaluation, in addition to the traditional educational objectives of knowledge acquisition and comprehension of subject matter. The *Taxonomy of Educational Objectives* (Bloom et al., 1956) promoted the need for teachers to incorporate higher-level thinking in their classes and subsequently led many to design activities to this end.

Vygotsky’s contributions from the 1960s furthered understandings of the dialogical character of learning. His research demonstrated the importance of language-based collaboration between members of learning communities involving both students and teachers. He argued that dialogue within educational settings was essential for the development of deeper conceptual understandings, and believed that “students performed at higher intellectual levels than otherwise expected when in collaborative situations” (Wilks, 2005, p. 2). In order to communicate these ideas, Vygotsky developed the concept of the ‘zone of proximal development’. This theory contended that productive learning occurred when student’s “empirically rich but disorganised spontaneous concepts ‘meet’ the systematicity and logic of adult reasoning” (Vygotsky, 1986, p. xxxv). As such, he suggested that conversation was an important vehicle for learning. Carrington (2006) identified Vygotsky’s work in social constructivist learning theory as filling a significant gap in effective learning theory for the middle years. Carrington (2006, p. 91) described Vygotsky’s contribution as attractive to middle years’ educators who were looking for, “a pedagogy suited to the emerging research around the developmental needs and intellectual potential of early adolescents”.

Gardner’s theory of Multiple Intelligences (1993; 1999) recognised the need to educate the ‘whole child’. He identified a number of inherent ‘intelligences’ including verbal/linguistic, logical/mathematical, visual/spatial, body/kinesthetic, musical/rhythmic, interpersonal, intrapersonal, and naturalistic. He described how people generally have preferred ways of learning aligned with these intelligences, or learning modalities. Gardner suggested that students should be granted opportunities to learn across these modalities, and that providing such opportunity would support them to become competent in a wide range of settings. He particularly championed the value of learning that involved social interactions, physical activity, interface with the natural world and creativity. Gardner’s learning principles have been adopted by Australian schools as ‘tools’ when seeking to deal with student diversity (Carrington, 2006).

Newmann (1992) and his colleagues (Newmann, Marks & Gamoran, 1996) developed ‘authentic education’ as an approach to facilitate the application of constructivism in schools. Their approach positioned intellectual quality as the central objective of learning. Beginning with the assumption that the point of education was to “improve the quality of the meanings we construct” (Newmann, Marks & Gamoran, 1996, p. 281), they developed ‘authentic education’ through three
criteria: construction of knowledge, disciplined inquiry and value beyond school. The construction of knowledge required that students focused on producing, rather than reproducing, meaning and knowledge. Disciplined inquiry supported students to engage in activities that enabled them to use prior knowledge from a range of fields in the pursuit of in-depth understandings (as opposed to superficial awareness) and asked students to express their conclusions through elaborated communication. Value beyond school required learning that was of personal value to students, rather than being formulated to allow the competence of the learner to be documented. Carrington (2006) described Newmann et al.’s ‘authentic education’ approach as one that had positively influenced daily life and student achievement in middle years’ learning settings in Australia.

Bruner’s (1996) contribution related to raising awareness of the influences that pervading cultures had on the learning process. He described how learning, or meaning-making, involved situating learning experiences within cultural contexts. He promoted awareness of the need to create learning cultures that can support the academic and social development of every student. He suggested that the cultural situatedness of meanings enables them to be readily communicated and that the ability to communicate meanings was what made them useful to the learner. He commented:

It is culture that provides the tools for organising and understanding our worlds in communicable ways … learning and thinking are always situated in a cultural setting and always dependent upon the utilisation of cultural resources. Even individual variation in the nature and use of mind can be attributed to the varied opportunities that different cultural settings provide (pp. 3-4).

Beare (2000a) outlined a vision for the future of schooling in Australia in Creating the future school. He suggested that education based on year groups, subjects, specialist teachers, hierarchies, linear progression, and graded criteria was already passing. In designing schools [conceptually] for the 21st century, he argued that it might be quite inappropriate and socially dysfunctional to allow outdated concepts and obsolete ideas about educational provision and learning to continue unchallenged. Beare envisaged learning in the 21st century becoming increasingly modularised, rather than organised into discrete subjects and he supported curriculum integration. As part of his vision, he suggested:

Educators as a group will find themselves responsible for mentoring a group of learners, directing them sequentially into projects or modules of activities, and keeping track of progress and outcomes. It is obvious that a project about volcanoes, for example, can simultaneously result in deepening reading skills, learning some physics or mathematics, and acquiring some knowledge about geography and geology. It is probably silly, if not impossible, to label such a project Language or Science, Maths or Geography (Beare, 2000b, p. web).
The middle years and student engagement

Following the *Hobart Declaration on Common and Agreed National Goals for Schooling* in 1989 and the subsequent *Adelaide Declaration on National Goals for Schooling* in 1999, the *Melbourne Declaration on Educational Goals for Young Australians* was published in 2008. This federal government document outlined two main goals for the education of young Australians (MCEETYA, 2008, p. 7):

**Goal 1:** Australian schooling promotes equity and excellence.
**Goal 2:** All young Australians become: successful learners, confident and creative individuals and active and informed citizens.

In elaborating on these goals, the Declaration made special mention of the middle years of schooling. It stated that (MCEETYA, 2008, p. 12):

The middle years are an important period of learning, in which knowledge of fundamental disciplines is developed, yet this is also a time when students are at the greatest risk of disengagement from learning. Student motivation and engagement in these years is critical, and can be influenced by tailoring approaches to teaching, with learning activities and learning environments that specifically consider the needs of middle years’ students. Focusing on student engagement and converting this into learning can have a significant impact on student outcomes. Effective transitions between primary and secondary schools are an important aspect of ensuring student engagement.

This identification of the middle years as a critical phase of schooling for young Australians followed more than fifteen years of research and government policy making regarding middle years students’ engagement in learning and with school. Influential papers including *From Alienation to Engagement* (Australian Curriculum Studies Association, 1996) and *The Middle Years: A Guide for Strategic Action in Year 5-9* (DEET, 1999) found that students in the middle years were feeling increasingly alienated, or disengaged, from learning and with school.

**Student engagement – the construct**

Researchers and authors generally consider ‘engagement’ to be composed of two major facets: namely, engagement of a specific learning nature (engagement in learning), and engagement of a general participatory nature (engagement with school) (Fullarton, 2002). This multifaceted approach to the construct of engagement reveals a broad vision of education, one that views schooling as a vehicle not only for academic development but for social and emotional development as well. Engagement in learning and with school was described by Russell, Ainley and Frydenberg (2005, p. 3) as “both an end in itself and a means to an end”, implying that
student engagement is an important outcome in its own right as well as a precursor to academic and social and emotional development.

The term ‘engagement’ was defined in a report from the Organisation for Economic Co-operation and Development (OECD) entitled Student engagement at school: A sense of belonging and participation (OECD, 2000, p. 8) as:

A disposition towards learning, working with others and functioning in a social institution, which is expressed in the students’ feelings that they belong at school, and in their participation in school activities.

This OECD report also used the term ‘disengaged from school’ to characterise students “who do not feel they belong at school and have withdrawn from school activities in a significant way” (OECD, 2000, p. 8).

Positive student engagement has been associated with concepts including participation, motivation, energy, action, direction, connection (Russell, Ainley & Frydenberg, 2005), autonomy, belonging, competence (Connell & Wellborn, 1991), effort, persistence (Skinner, Wellborn & Connell, 1990) attention, interest and investment (Marks, 2000). Disengagement, on the other hand, has been associated with concepts including estrangement, detachment, fragmentation, isolation, powerlessness, meaninglessness, normlessness, disconnectedness (Cumming, 1996) and boredom (Appleton et al., 2008). In addition, Murray et al. (2004) suggested that indicators of disengagement included, not paying attention, not completing school work, disruptive behaviour, withdrawal, underachievement, truancy and school refusal.

With regard to students’ social and emotional development, engagement was found to be a key factor leading to the achievement of learning outcomes related to adolescents’ understandings of themselves, the world, and their place in it (DEET, 1999). In addition, the development of students’ personal and social skills, including the development of positive self-concept, self-discipline and self-worth were thought to be supported by higher levels of engagement (Fullarton, 2002).

With regard to academic achievement, student engagement was found to support academic performance, especially when associated with students’ interests in particular learning domains (e.g. history or mathematics) (Russell, Ainley & Frydenberg, 2005). Positive relationships with school were also thought to encourage students to become life-long learners likely to move in and out of education and training as they find it necessary throughout their lives (Fullarton, 2002).
Student disengagement was believed to lead to detrimental outcomes for individual students and associated problems within the wider community (Kortering & Braziel, 2008). For individuals, the primary consequences of disengagement included a greater likelihood of leaving school early with inadequate qualifications (OECD, 2000; Kortering & Braziel, 2008), reduced chances of participating in further education (OECD, 2000) and increased difficulties finding stable employment (Kortering & Braziel, 2008). Disengaged students also experienced ongoing physiological and social difficulties (OECD, 2000).

In Australia, academic stagnation, and even regression, were attributed to middle years’ students becoming disengaged (Carrington, 2006). Hill and Russell (1999, p. 21) described this as “a major issue confronted by [schooling] systems everywhere”. Evidence published in Systemic, whole-school reform of the middle years of schooling (Hill & Russell, 1999) showed that middle years’ students showed virtually no growth in reading, writing, speaking and listening, and a decline in achievement in these areas for the lowest 25 per cent, particularly in Year 7.

Research findings of this nature promoted interest in re-evaluating and reforming middle years’ education systems in Australia in order to provide a more engaging and productive experience for students. From the late 1990s research findings and government policy documents from across Australia advocated the need for holistic reform in the middle years in order to address adolescents’ lack of engagement in learning and with school (DEET, 1999; Hill & Russell, 1999; Beare, 2000; DEET, 2002; DETA, 2003; Russell et al., 2003; DET, 2006; DEET, 2007).

Recent reform initiatives regarding middle years’ education in Australia are discussed below (see ‘Contemporary approaches to teaching and learning in the middle years’).

**Student engagement – dimensions of the construct**

Academic debate regarding how to define the construct of student engagement is ongoing (Zinger, 2007; Appleton et al., 2008). However, educators and researchers recognise that student engagement in learning and with school is critically important if positive educational outcomes are to be achieved (Fredricks, Blumenfeld & Paris, 2004; Zyngier, 2007; Appleton et al., 2008). Further to this, Furlong and Christenson (2008, p. 365) reported that there is “consensus that student engagement is a relevant and multidimensional construct that integrates students’ thoughts, feelings, and behaviors”.

Although defining the construct of engagement has proven to be a difficult task for researchers, most typically they have incorporated a three-part typology, emphasizing affective (emotional), behavioral, and cognitive dimensions of engagement (Fredricks, Blumenfeld & Paris, 2004;
Furlong & Chistenson, 2008). Others, including Appleton et al. (2006), have identified four engagement subtypes: academic, behavioral, cognitive and psychological. Fredricks, Blumenfeld and Paris (2004) reviewed more than 160 studies on engagement in defining their three-part typology. Their definition of student engagement was well accepted in Australia, including by Russell, Ainley and Frydenberg (2005) and Murray et al. (2004), and has been adopted in this study. Paraphrased below is their description of the three engagement subtypes:

- **Behavioural engagement** draws on the idea of participation; it includes involvement in academic and social or extracurricular activities and is considered crucial for achieving positive academic outcomes and preventing dropping out.

- **Emotional engagement** encompasses positive and negative reactions to teachers, classmates, academics, and school and is presumed to create ties to an institution and influence willingness to do the work.

- **Cognitive engagement** draws on the idea of investment; it incorporates thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills (Fredricks, Blumenfeld & Paris, 2004, p. 60).

It should be noted that researchers have used the terms ‘affective’ and ‘emotional’ interchangeably to describe engagement based on the feelings students have regarding aspects of their schooling.

**Researching student engagement**

Defining methods by which to measure student engagement has challenged researchers, especially due to the constructs’ multidimensional nature. Fredricks, Blumenfeld and Paris (2004) found that researchers often focused on one or two engagement subtypes, not all three at once, and frequently used surveys as measurement tools to assess student engagement. They suggested that this approach to measuring engagement failed to appropriately consider the interplay, or synergy, between the affective, behavioural and cognitive dimensions of engagement.

Helme and Clarke (2001) described the interplay between the engagement subtypes as being vitally important in promoting overall student engagement, and Zimmerman (1990) found that this interplay was particularly important for students’ self-regulation of learning.

Fredricks, Blumenfeld and Paris (2004) acknowledged that concurrent, in-depth study of all three engagement subtypes can be difficult. They recommended an approach that combined observation and ethnography, describing such an approach as a reliable and efficient method of
assessing overall student engagement. They commented that although an approach based on observation and ethnography may not provide detailed understandings regarding any one dimension of engagement, it was respectful of the multidimensional nature of the construct.

**The influence of learning environments on student engagement**

Research directly exploring the influence of physical learning environments on student engagement is limited, although some does exist. The OECD report, *Student engagement at school: A sense of belonging and participation* (OECD, 2000) identified the quality of school infrastructure as a potential influence on student engagement and reported findings from a 43 country survey that indicated that the quality of school infrastructure did not have a statistically significant impact on engagement. As stated in the report (OECD, 2000, p 43), this survey was:

... a summary measure derived from Principal reports of the extent to which the learning of 15-year-olds was hindered by (a) poor condition of school buildings; (b) poor heating, cooling and/or lighting systems; (c) lack of instructional space (e.g., classrooms); (d) lack of instruction material (e.g. textbooks); (e) not enough computers for instruction; (f) lack of instructional materials in the library; and (g) inadequate science laboratory equipment.

This investigation into the relationship between learning environments and student engagement focussed on the technical aspects of educational environments, rather than on the influence that innovative school design had on pedagogical practices.

Zyngier made a connection between engagement and learning environments. He stated that, "engagement must not be disconnected from time, place and space" (Zyngier, 2007, p. 8). However, he did not explore these relationships beyond theoretical notions, or in any depth.

Janowska and Atlay (2008) made a stronger connection between learning environments and student engagement. They explored the influence of a specifically designed ‘creative learning space’ on “students engagement with the learning process, their motivation to explore, experience and discover, and on them becoming more active, autonomous learners” (Janowska & Atlay, 2008, p. 271). In analysing participant students’ responses to working in the ‘creative learning space’ they identified the use of the following adjectives: “creative, positive, interactive, enjoyable, exciting, flexible, productive, engaging, involving, encouraging, inspiring, stimulating, fresh, functional, comfortable, relaxing, informal, [and] personal” (Janowska & Atlay, 2008, p. 278). Based on these responses, they concluded that the ‘creative learning space’ had a positive influence on students’ experience and their engagement with the learning process. They also
suggested that more in-depth analysis was needed in order to better understand how ‘creative’ and other spaces could meet the needs of curriculum and students.

**The relationship between student engagement and learning environments – the research gap**

My review of the literature suggests that research into the influence of learning environments on student engagement is limited – especially that related to pedagogical practice. This gap in the literature provided me with an opportunity to investigate the current relationships between innovative learning environments, pedagogies and student engagement, within the context of middle years’ educational reform. One of the intentions of this study is to respond to the following challenge set out by Fredricks, Blumenfeld and Paris (2004, p. 87):

> Future research should address the difficulties of studying how individuals and contexts interact. We need to know more about … how individuals respond to opportunities afforded by educational contexts and how the differences affect school success … The hope is that such interventions can counteract well-documented declines in motivation and engagement and bring about the level of commitment that students need to benefit from schooling and to meet the challenges of society.

**Contemporary approaches to teaching and learning in the middle years**

The Department of Education, Employment and Training (Victoria) (1999) described the essential aim of middle years’ reform as being the re-engagement of young people in learning and with school. Some of the early research in Australia that shaped the actions of schools attempting to re-engage students was outlined in *Shaping middle schooling in Australia: A report of the National Middle Schooling Project* (Barratt, 1998). In this report, Barratt identified the specific needs of adolescent learners. These are outlined below (see Table 1).
Table 1. Specific needs which must be addressed in the middle years of schooling (Barratt, 1998, p. 55).

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td>Exploring how individual and group identities are shaped by social and cultural groups.</td>
</tr>
<tr>
<td>Relationships</td>
<td>Developing productive and affirming relationships with adults and peers in an environment that respects differences and diversity.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Having opportunities to negotiate learning that is useful now, as well as in the future.</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Viewing the world critically, and acting independently, cooperatively and responsibly.</td>
</tr>
<tr>
<td>Success</td>
<td>Having multiple opportunities to learn valued knowledge and skills as well as the opportunity to use talents and expertise that students bring to the learning environment.</td>
</tr>
<tr>
<td>Rigour</td>
<td>Taking on realistic learning challenges in an environment characterised by high expectations and constructive and honest feedback.</td>
</tr>
<tr>
<td>Safety</td>
<td>Learning in a safe, caring and stimulating environment that addresses issues of discrimination and harassment, such as racism.</td>
</tr>
</tbody>
</table>

Following this outline of adolescents' needs, Barratt (1998) presented a set of principles to inform reform actions in the middle years (see Table 2).
Table 2. Principles which constitute essential components of middle schooling (Barratt, 1998, p. 56).

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Learner-centred</td>
<td>Coherent curriculum is focused on the identified needs, interests, and concerns of students, and with an emphasis on self-directed and co-constructed learning.</td>
</tr>
<tr>
<td>Collaboratively organised</td>
<td>Powerful pedagogy is employed by teams of teachers who know and understand their students very well, and who challenge and extend them in supportive environments.</td>
</tr>
<tr>
<td>Outcome-based</td>
<td>Progress and achievement are recorded continuously in relation to explicit statements of what each student is expected to know and be able to do.</td>
</tr>
<tr>
<td>Flexibly constructed</td>
<td>Arrangements are responsive to local needs and circumstances, and reflect creative uses of time, space and other resources.</td>
</tr>
<tr>
<td>Ethically aware</td>
<td>Justice, care, respect, and a concern for the needs of others are reflected in everyday practice of students, teachers and administrators.</td>
</tr>
<tr>
<td>Community-oriented</td>
<td>Parents together with representatives from a diverse range of groups, institutions and organisations beyond the school, are involved in productive partnerships.</td>
</tr>
<tr>
<td>Adequately resourced</td>
<td>Experienced teachers and support staff, supported by high quality facilities, technology, equipment and materials, constitute essential requirements.</td>
</tr>
<tr>
<td>Strategically linked</td>
<td>A discrete phase of schooling is implemented as a stage within a Kindergarten to Year 12 continuum and connected to the early and later years.</td>
</tr>
</tbody>
</table>

Eight years on, Carrington (2006) identified Barratt's research findings and recommendations as a set of 'signature practices' that had informed attempts to reform middle years' education in many schools. The 'signature practices' that Carrington (2006, p. 71) indentified included; “flexible use of time and space; interdisciplinary teacher teams; heterogeneous student groupings;
negotiated and integrated curriculum; home rooms; and minimal teacher-student rotations”. Although these practices may be recognised by researchers and some educators as being closely aligned with approaches to middle years’ education, reforms of this nature have been identified as historically very slow to be adopted in schools (DEET, 2002; Pendergast, 2006).

Hill and Russell (1999) provided a broader, or more general, framework for intervening in the provision of middle years’ education in *Systemic, whole school reform of the middle years of schooling*. In their model, based on the earlier work by Hill and Crévol (Crévola & Hill, 1998; Hill & Crévol, 1998), they suggested a number of areas to be targeted by those attempting reform in the middle years (see Figure 3).

![Figure 3. Whole school design for school improvement (Hill & Russell, 1999, p.14).](image)

Hill and Russell’s (1999) reform framework dealt with a range of practical, organisational and conceptual issues. Yet, like Barratt’s (1998) reform principles, this framework did not overtly address the design of physical learning environments as part of the middle years’ reform process. Although Barratt alluded to spatial issues in identifying “creative uses of time, space and other resources”, “high quality facilities, technology, equipment and materials” and “teams of teachers” (Barratt, 1998, p. 56), she didn’t directly explore the associated influence of learning environments on the implementation of these and other reform measures.

Smyth, McInerney & Hattam (2003) proposed another model for middle years’ reform. Their model was more closely aligned with the educational practices in which students and teachers
engaged. They identified ‘learning space’ as a school structure, or organisational element, that needed to be addressed within the wider framework of middle years’ reform – especially reforms associated with pedagogy. They suggested that purpose-built learning spaces were needed, but did not go into any detail regarding the design requirements of these spaces. Their model for middle school reform is shown below (see Figure 4).

![Figure 4. Model of middle school reform: features of re-structuring and changing pedagogy (Smyth, McInerney & Hattam, 2003, p. 181).](image)

**Curriculum reform in the middle years**

Curriculum documents in schools generally identify what students are expected to learn about and the skills that they are expected to acquire. Currently, Australian states and territories are responsible for creating their own curriculum documents. These are disseminated to schools and generally act as guides for curriculum planning and delivery. It is expected that over the next few years, these state and territory-based curricula will be replaced by the Australian Curriculum for Kindergarten to Year 12 (ACARA, 2010).
While state and territory curricula have previously been slow to adapt to the demands that society has placed on young people (VCAA, 2005), recent iterations have attempted to make subject matter and learning more appealing, relevant and engaging for adolescents. Such changes have been informed by improved understandings of the needs of middle years’ learners (DECS, 2010).

During the past two decades in Australia, the key curriculum reform measure in the middle years has been ‘curriculum integration’ (Dowden, 2007). In an attempt to better connect curricula to the life experiences of early adolescents, state and territory curricula documents have adopted strategies to integrate previously siloed curriculum areas or subject domains. Wallace et al. (2007, p.29) described this integration of subject matter as a strategy intended to engage students, “by providing opportunities to work on a few cross-curricular objectives, to apply knowledge across the subject boundaries and to work on tasks with meaning and relevance”.

Curriculum integration is a complex matter, however, with ‘integrated curriculum’ being a generic term that refers to many forms of curriculum integration, including integrated curriculum, interdisciplinary curriculum, multidisciplinary curriculum, fused curricula, transdisciplinary curriculum, cross-disciplinary curriculum, and integrative curriculum (Dowden, 2007). Wallace et al. (2007) identified still more forms, or variations, of curriculum integration including, synchronised, cross-curricular, thematic, project-based, school-specialised and community focussed curricula.

Dowden (2007) identified two predominant models of curriculum integration in contemporary middle years’ practice: the student-centred integrative model and the subject-centred multidisciplinary model. The student-centred integrative model has been attributed to Beane (1990), who founded his integration strategy on the theoretical work of John Dewey. The premise for this generative style of curriculum integration is two basic questions asked of students: “What questions do you have about yourself? What questions do you have about your world?” (Beane, 1997, p. 86). Using these questions as a starting point, the curriculum is then generated, or ‘negotiated’, through an iterative process involving students and teachers.

The subject-centred multidisciplinary model, on the other hand, relies on long-range planning by teachers, usually at the exclusion of input from students. This model applies the notion of correlation to integrate discrete subject areas, and requires teachers to create matrices that cross-reference subject areas to ensure subject matter in each domain is efficiently covered (Dowden, 2007). This strategy was criticised by Dowden (2007) for its autocratic nature, its lack of sympathy for the developmental needs of early adolescents and its lack of site specificity. He went further to say that such an integrated curriculum model "appears to justify pedagogies that
are poorly conceived because they deliver parcels of knowledge pre-packaged by teachers or textbook writers” (Dowden, 2007, p. 62).

Pendergast and Bahr (2005) suggested that a blend of student-centred and teacher-centred curriculum approaches may be desirable if teachers are to be considered agents of society as well as teachers of students. They proposed the potential for curriculum integration to be not either/or but a synthesis of the two predominant models.

Looney and Klenowski (2008) described the recent emergence of what they called a ‘new-form/re-form curriculum’ and suggested that this very recent form of curriculum was a product of today’s ‘knowledge society’. They described this emergent curriculum as being formulated through ideas “well beyond the discussions of outcomes and curriculum alignment that characterised much curriculum reform effort in the late 1990s” (Looney & Klenowski, 2008, p. 177). They characterised their concept of the ‘new-form/re-form curriculum’ as a curriculum in which content was displaced by skills, knowledge acquisition was replaced by the process of learning and notions of curriculum coverage were replaced by a desire for learner engagement.

Importantly, despite the predicted and found benefits of middle years’ research, Wallace et al. (2007) identified integrated curriculum reform as having only been successfully introduced into a few schools. They identified curriculum integration as difficult to sustain over time and suggested that teachers often revert to traditional methods when “energy flags, support lessons and things get difficult” (Wallace et al., 2007, p. 31).

**Pedagogical reform in the middle years**

In addition to curriculum reforms, middle years’ educators have focussed on updating pedagogies to suit the needs of early adolescents in contemporary society (Carrington, 2006; Pendergast & Bahr, 2005; Smyth & McInerney, 2007). The term ‘pedagogy’ refers to the instructional style or strategy employed to educate learners. In *The principles of learning and teaching P-12 background paper* (DEECD, 2010, p. web), pedagogy was described as follows:

Pedagogy involves much more than its most obvious component, the tasks that teachers set. It includes the ways in which teachers interact with students: that is how they question and respond to questions, use students’ ideas and respond to students’ diverse backgrounds and interests. It includes the social and intellectual climate that teachers seek to create and the types of learning that they set out to promote. It also includes the decisions they make about framing the content around a series of tasks to be completed or as key ideas and skills that are revisited and built on. Teachers also need to think about how they link and sequence activities and how and what they assess.
A debate over whether pedagogies in the middle years should be more student-centred (constructivist) or teacher-centred (instructivist) continues—in line with the discourse surrounding curriculum reform. Historically, instructivist or didactic teaching strategies were most common; however, there has been growing acceptance of constructivist pedagogies in the middle years during recent times (Carrington, 2006; Pendergast & Bahr, 2005).

Constructivism challenges the validity and effectiveness of education based on the transmission of knowledge via the traditional teacher-student relationship. A shift to constructivist approaches may partly be attributed to research findings from the field of cognitive psychology that have indicated that constructivist learning situations support learning, particularly that of a conceptual nature (Gabler & Schroeder, 2003). The contemporary timing of this shift underlines De Corte's (2000) perspective that education has until recently not been improved in ways that reflected advances in understandings about the processes of learning and teaching.

Strommen and Lincoln (1992) provided an outline of the constructivist approach in *Constructivism, technology and the future of classroom learning*. They suggested that “constructivism emphasises the careful study of the processes by which children create and develop their ideas” (p. 468) and described how students actively constructed their knowledge and invented ideas via a process of assimilating new information to simple, pre-existing notions. They suggested that students learned via a constructivist process, rather than absorbing ideas transmitted to them by teachers or learning via repeated rote practice. Furthermore, they suggested that students' ideas gained in “complexity and power [as they] develop critical insight into how they think and what they know about the world” (p. 468).

In keeping with these ideas about constructivist learning, the following table (Table 3), which was developed by Pendergast and Bahr (2005), outlines some of the principles and practices of ‘middle school pedagogy’ that have been advocated prominent pedagogical models developed in Australia and the United States.
Research has indicated that constructivist approaches to teaching and learning during the middle years can assist students to maintain engagement and improve learning outcomes (Cumming, 1996; Hargreaves, Earl & Ryan, 1996; Barratt, 1998; Hill & Russell, 1999). Constructivist pedagogies, such as those described above, have also been identified as critical in the process of middle years’ reform by state and territory education departments across Australia (DEET, 2002; DEET, 2007; DET, 2006; DETA, 2003). Carrington (2006) summarised the potential positive influence of constructivist pedagogies. She contended that constructivist approaches to learning and teaching support students to become active learners who are able to build on existing knowledge in collaborative situations. In addition, Zyngier (2003) argued that constructivist pedagogical settings within which students are encouraged to think critically are of the utmost importance, emphasising the need for improved connectedness within school communities and between schools and the wider community.

If the adoption of constructivist pedagogies in Australian schools has been slow, as has been suggested (DEET, 2002), it does not appear to be due to a lack of state government policy.
direction. Rather, there appears to be a problem of implementation at the level of individual schools. In response to this issue, Fisher (2002) concluded that there are spatial implications related to pedagogical approaches. He suggested that spatial arrangements can significantly influence the social power structures found in schools and that such structures can have a profound impact on the development of pedagogies.

**Assessment reform in the middle years**

Assessment practices in the middle years have evolved alongside changes to curriculum and pedagogy. Historically, the dominant assessment model was one of summative assessment, or assessment that captured student achievement at certain points in time. Summative assessments are characterised by the grading of students' work by teachers upon the completion of tasks or tests. Such practices have been criticised for their narrow focus on specific knowledge and not adequately detailing the processes by which students learn. Summative assessment practices have also been criticised for de-contextualising assessment from the learning situation and for supporting pedagogical approaches that regard learners as ‘recipients of learning’ (Brady & Scully, 2005). Of summative assessment practices, Wyatt-Smith, Cumming & Elkins (2005, p. 272) commented:

> Nothing can be so dampening on learning by middle years’ students as narrowly construed assessment that serves only to reinforce a sense of failure and diminish self-esteem.

Assessment reform in the middle years focussed on the introduction of formative assessment practices. Formative assessments, sometimes referred to as ‘authentic assessments’ (Brady & Scully, 2005), rely on a variety of assessment practices in order to detail the quality of students’ achievement and are thought to better capture understandings of the learning process. These assessments may include "rich questioning, comment-only marking (no grades), sharing criteria with learners, and student peer-assessment and self-assessment” (Wyatt-Smith, Cumming and Elkins, 2005, p. 273). These forms of assessment often encourage students to partake in the critique of their own work and were identified by Wyatt-Smith, Cumming and Elkins (2005) as the most powerful assessments for supporting further student achievement. Additionally, formative assessment practices are thought to support pedagogies that involve a wider variety of challenging tasks and real-world activities (Brady & Scully, 2005).

However, against this backdrop of reform, schools have experienced increased accountability pressures from state, national and international agencies in recent years. Wyatt-Smith, Cumming and Elkins (2005, p. 271) described the middle years of schooling as:
... the years most under focus for accountability, with testing systems for national reporting in Year 3, 5 and 7 [National Assessment Program Literacy and Numeracy – now including Year 9], other systems mooted for Years 4, 6 and 9, and international comparative studies such as the Third International Mathematics and Science Studies (TIMSS) and the Program for International School Assessment (PISA) assessing English, mathematics and science achievement for 10- and 14-year-olds.

Australian schools are seeking to find a balance between summative and formative assessment practices as they try to meet externally imposed summative accountabilities, while simultaneously attempting to meet the needs of, as well as engage, middle years’ students.

**Instructional models for the middle years in Victoria**

Victoria’s Middle Years Research and Development (MYRAD) Project (DEET, 2002) report recommended the implementation of constructivist approaches to teaching and learning. The report concluded that such approaches would assist student learning. The recommendations of the report included: “strengthening teacher-student relationships; involving students in decision-making about content, process and assessment; presenting authentic tasks that require complex thought and allowing time for exploration; inclusion of processes involving co-operation, communication, negotiation and social competencies generally; providing for individual differences in interest, achievement and learning styles” (DEET, 2002, p. web).

Based on the MYRAD Project’s findings, the *Principles of Learning and Teaching (P-12) (PoLT)* (DEECD, 2009a) instructional model was developed and endorsed by the Victorian Department of Education and Early Childhood Development (DEECD) in 2004. Cara (2009) suggested that the implementation of PoLT in Victorian schools drove a reflective process that aimed to engage teachers in conversations about pedagogical practice. Furthermore, she concluded that PoLT had influenced pedagogical reform and enhanced the learning experience for students in some schools. The six basic principles of PoLT are listed below:

1. The learning environment is supportive and productive.
2. The learning environment promotes independence, interdependence and self-motivation.
3. Students’ needs, backgrounds, perspectives and interests are reflected in the learning program.
4. Students are challenged and supported to develop deep levels of thinking and application.
5. Assessment practices are an integral part of teaching and learning.

The references to 'learning environment' in PoLT refer to the conceptual, or psychological, environment rather than to the physical learning environment, or space.

Like PoLT, the more recently introduced e5 Instructional Model (DEECD, 2009b, p. web) also advocated constructivist approaches to education. e5 comprised a model based around the following framework: Engage, Explore, Explain, Elaborate, Evaluate.

DEECD (2009b, p. web) described this model as "a reference point for school leaders and teachers to develop a deeper understanding of what constitutes high quality teacher practice in the classroom". The model was introduced to "describe what effective teachers do in the classroom to engage students in intellectually demanding work".

The relationship between middle years reform and learning environments – the research gap

One of the stated intentions of this research project was to explore the role that space could play within the ongoing nationwide project of middle years’ reform. It aims to investigate the relationships between innovative learning environments, pedagogies and student engagement and attempt to understand how innovation in the design of learning environments might support middle years’ reform and subsequently the improved engagement of students.

By examining middle years’ education through a spatial/geographical lens, I anticipated that new dimensions could be added to the continuing discourse surrounding middle years’ education. Through research into the experiences of middle years’ students and teachers in innovatively designed learning environments, including an examination of the interactions between educational practices and space, perhaps educational opportunities and pitfalls would be revealed.

With the development of ‘constructivism’, researchers and educators have questioned the traditional teacher-led education models that have dominated educational practice since the industrial revolution (Lackney, 1998). In recent years, increased adoption of constructivist approaches has led to changes in pedagogies in some schools. Subsequently, these pedagogies have placed pressure on schools to modify facilities and cater spatially for new education models.
Within the literature about middle years’ reform there are only fleeting mentions of school building design or physical learning environments (Beare, 2000a; Smyth, McInerney & Hattam, 2003; Zyngier, 2007; Janowska and Atlay, 2008). Discourse related to the middle years focuses on conceptual issues, especially the traditional educational mechanisms of curriculum, pedagogy and assessment. Woven into this discussion is mention of the integration of digital technologies into traditional classrooms, but discussion regarding the material nature of learning and schooling, and of the physical environment, is lacking. References to ‘learning environments’ within educational circles are associated with conceptual or psychological environments, rather than physical environments or spaces.

**School space, spatiality and design**

**Why school spaces?**

In 2009, Newton and Fisher suggested that the physical environments in schools embody society’s attitudes to youth and education and concluded that school learning environments have recently begun to change in response to current societal attitudes from clusters of isolated classrooms into learning and information environments. In their opinion, the recent introduction of information and communication technologies (ICT’s) and changes to the structural and material elements in schools had influenced the social dynamics in schools and begun to change the nature of schooling. They concluded that students in contemporary schools were able to experience learning in both physical and virtual worlds and that these experiences supported learning that was connected to both local and global communities.

However, designing effective physical contexts for learning is difficult. To illustrate this point, Heppell et al. (2004) described the building of “appropriate, engaging, challenging, seductive, ambitious, effective, world class schools [as] highly complex” (p. 1), suggesting that such complexity is “neither well understood nor well documented [and is thus] not well implemented either” (p. 1).

With forward thinking schools seeking to personalise the learning experience for their students so that they develop their individual potential, the challenge for architects and educators has been to create school environments that support constructivist educational philosophies and pedagogies (Beare, 2000a). According to Burton (2007), personalisation addresses students’ cognitive styles, learning strategies and their preferences for learning in particular environments. In response to educational innovations, design teams have been asked to address a new set of design drivers.
associated with the integration of ICT’s into schools and new social organisational structures (Beare, 2000a).

When reviewing the impacts of contemporary pedagogical approaches on school design, Heppell et al. (2004 p. 20) concluded that schools need to change significantly:

We will not learn enough about the schools we need in the future unless some schools now can explore significantly different hours, timetabling, subject organization, pastoral structures, assessments, testing and much more besides … failure to do this will threaten future children’s learning opportunities.

They suggested that spatial changes have recently been adopted by the ‘boldest schools’. They suggested that these schools had questioned historical norms associated with standardized curriculum, class sizes and rooms. Furthermore, their research into global educational trends revealed that innovative schools had created new socio-pedagogical contexts for learning characterised by mixed-aged student cohorts, cross curriculum study, team teaching with support from paraprofessionals, learning beyond school via the internet and through direct involvement with local communities, and longer school days for students due to recent changes to before-school and after-school care arrangements. They described the impacts of these changes to school organisational structures as “frighteningly interdependent” (Heppell et al., 2004, p. 19).

In addition to pedagogic, technological and organisational drivers, they identified a number of additional drivers of change that had informed the physical design of schools over recent years. They identified these as being social, children’s expectation and entitlement, economic, environmental, scale, political, community and design life drivers, and described all as having profound implications for the physical requirements of schools.

**Exploring the future of school design – the research gap**

To explore the influences of all of the school design drivers that were identified by Heppell et al. (2004) is clearly not possible in a single PhD dissertation. Instead, this study focuses largely on the impacts of pedagogic drivers on the design and use of school learning environments—in particular the relationships between innovative learning environments, pedagogies and student engagement.

The need for research of this type was highlighted by Heppell et al. (2004), who concluded that architects required further education regarding pedagogic design principles. They suggested that there was an immediate need for research that can inform school architecture and interior design, concluding that:
... most architects emerged from training with a clear understanding of energy efficiency and environmental aspects ... However, it was clear that none, or certainly very few, emerged with any detailed understanding of pedagogy and the impact of design on it ... Thus architects are often able to specify a “green” school and be confident about heat and energy losses, yet are not able to specify in any detail the learning gains and losses resulting from poor pedagogic design. This is broader than education; with almost every organisation espousing the rhetoric of a “learning organisation” this divorce of architecture from learning must end (Heppell et al., 2004, p. 26).

On a pragmatic level, one of the overarching objectives of this study was to produce research evidence to assist architects and educators to design school facilities to support improved learning experiences for middle years’ students today and into the future.

**Space in schools**

The physical spaces in schools are thought to have a significant influence on the overall wellbeing of students, teachers, principals and administrators (Buckley, Schneider & Shang, 2005). Furthermore, it has been suggested that school environments affect the ways students learn (Weinstein, 1981; Upitis, 2004; Lippman, 2007) and influence their academic performance (Lackney, 1999).

Weinstein (1981) proposed that physical environments can have an impact on learning by moderating social, psychological and instructional variables. Based on findings from environmental psychology studies into person-environment relations, she suggested that the physical spaces in schools can facilitate or inhibit learning through both ‘direct effects’, such as noise or crowding, and through ‘symbolic effects’, such as when poor conditions communicate to students a lack of respect for them on the part of the school they attend. For these reasons, Weinstein recommended that learning environments in schools should be considered as important as the curriculum and that the physical aspects of learning should be carefully planned by teachers in order to match with teaching objectives and the learning needs of students.

A review of the literature (Weinstein, 1979; 1981; Clarke, 2001; Edwards & Clarke, 2002; Fisher, 2004; Heppell et al., 2004; McGregor, 2004a; 2004b; 2004c; Upitis, 2004; Hartnell-Young, 2006; Wall, Dockrell & Peacey, 2008; Wheeler, 2008, Taylor, 2009) suggests that many researchers, architects and educators would agree with Lippman’s (2007, p. 6) statement that, “physical environments cannot be viewed as the backdrop for knowledge acquisition, but rather as influencing learning”.

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Communication of pedagogical intent through the physical environment

One of the ways the built environment affects how students learn and teachers teach is through communicating pedagogical intent (Monahan, 2002; Upitis, 2004; JISC, 2006; Burke & Grosvenor, 2008). To this end, Upitis (2004) identified traditional classrooms as learning environments that embody a transmission model of teaching and learning. She concluded that traditional classrooms, born out of the Industrial Revolution, have perpetuated a transmission style of education based on core subjects such as English, mathematics and science, usually at the expense of interdisciplinary studies. Furthermore, she described how for nearly two hundred years the majority of schools have been designed to reflect this factory model of education—a model that has seen homogeneous groups of students confined to classrooms, filled with knowledge based on set curricula, tested according to standardised measures, and moved from classroom to classroom for the duration of their schooling until deemed ready for the workplace or tertiary study.

Monahan’s (2002) concept of ‘built pedagogy’ provided a theoretical lens through which to interrogate the influence of space on educational practices. He defined built pedagogy as “the architectural embodiments of educational philosophies” (Monahan, 2002, p. web) or “the lessons taught by technological systems and spaces” (Monahan, 2005, p.9). He suggested that school spaces provided a ‘script’ for teachers and students to follow and concluded that learning environments were able to teach students and teachers about how they should behave. Monahan (2005, p. 8) commented on the influence of space on individuals:

Architects, educational philosophers and teachers know well the force that spatial configurations exert on people—how they shape what actions are possible, practical, or even conceivable. Because space constrains certain actions and affords others, the design and layout of space teaches us about our proper roles and places in society.

Monahan (2005) further described how the creation of school spaces was intrinsically tied to the pedagogical philosophies that informed educational practices. He contended that built pedagogies operated along a continuum between discipline and autonomy. At one end, space may restrict learning opportunities by not allowing for certain movements, flows or activities (discipline), while at the other end, learning environments may enable individuals to interpret space and use it as they see fit (autonomy) (Monahan, 2002). The following diagram visually represents this concept (see Figure 5).
Learning environments, ICT and pedagogy at the intersection of the physical and the virtual

According to Upitis (2004), schools must move on from those pedagogies and environments within which teachers have remained primarily transmitters of information to keep pace with the social constructs that new technologies allow. Over recent years this challenge has seen designers and educators attempting to create opportunities for students to engage in online and virtual learning experiences within the physical spaces of schools. However, it appears that making this shift has proven difficult. Mioduser et al. (2003) suggested that many schools have found both the integration of ICT into learning environments and the effective pedagogical use of ICT troublesome. They proposed that the conservative tendencies of schools have acted to preserve traditional structures and mitigated innovation and attempts to implement effective technological change. Furthermore, Skill and Young (2002) and Thompson (2005) both found that traditional classrooms often limited the options for effective ICT integration and suggested that the assimilation of ICT into schools has placed pressure on existing school architecture. In addition, Skill and Young (2002) suggested that limitations associated with funding and the
demands that change can place on the time and energy of school staff had also restricted schools from transforming their pedagogical approaches.

Where change has occurred, Cuban et al. (2001) suggested that it has been via complicated processes involving learning environments, pedagogies, students and teachers. In keeping with this opinion, Zandvliet and Fraser (2004) suggested that the global trend towards integrating ICT into schools was associated with contemporary ideas about pedagogy, integrated curricula, individualisation of learning, learning through cooperative group work and a focus on higher-order thinking. Through studies of technology-aided classrooms, they found that careful consideration of pedagogical requirements, rather than technical requirements, was essential for the successful design of learning environments. They suggested that involving teachers in the design of ICT rich learning environments was critical if new resources were to be used as part of a well conceived pedagogical approach.

Zandvliet and Fraser (2004) also raised issues associated with the introduction of portable and wireless technologies. They recommended that schools should take a holistic view of learning environments when updating technological resources. More specifically, Thompson (2005) recommended that computer-aided learning environments should include spaces for specific tasks, such as face-to-face lessons or class meetings, planning group work, carrying out group work, distance learning, and self-paced or individual work. In particular, she found that learning environments fitted with desktop computers required technology-free spaces situated adjacent to computers to allow students to plan computer aided tasks prior to commencing work at the computer.

Skill and Young (2002) described the ‘spaces’ created at the intersection of the physical and the virtual as hybrid or blended spaces. They suggested that when these integrated learning environments were well designed they can accommodate diverse learning experiences that could “embrace, empower and sustain learners of differing capabilities and interests” (p. 24). They considered the ongoing development of hybrid or blended spaces as an opportunity for teachers and students to participate in the creation of new ‘scripts’ for learning, referring to the pedagogical frameworks within which teaching and learning occurred. Mioduser et al. (2003) agreed with Skill and Young (2002) and concluded that the ‘grammar of schooling’ (Tyack & Cuban, 1995) was slowly being transformed by the integration of ICT.

Based on his study of the influences of globalisation and technology on schools in the Los Angeles area, Monahan (2005) described how technologies could operate as extensions of space and suggested that the presence of computers could reinforce or challenge traditional
expectations about spatial arrangements and pedagogical practices. He concluded that when desktop computers were arranged in linear rows they created a barrier that socially disconnected students and teachers and reinforced a climate of discipline. On the other hand, he found that the arrangement of computers in cluster patterns encouraged students to work collaboratively and with greater autonomy. He suggested that clustered patterns destabilised some of the centralised control usually granted to teachers and opened up the learning environment to enable more diverse learning opportunities. In this way, new technologies placed pressure on pedagogical approaches by influencing social dynamics and the power relations between students and teachers.

With school buildings now being required to accommodate a multitude of new technologies including desktop and laptop computers, interactive whiteboards, data-logging equipment, personal digital assistants (PDA’s – e.g. ‘iPod touch’) and digital video and still cameras, Weiss (2007) called for new pedagogical models that could take advantage of hybrid learning environments. He contended that educators had largely used new technologies in ways that conformed to the existing structures of space and time in traditional classrooms rather than integrating them into new practices based on the “inherent spatial and temporal logic of the resources themselves” (Weiss, 2007, p. 81). Weiss (2007) highlighted Cuban et al.’s (2001) conclusion that there had been a disconnection between the pervasiveness of digital and online technologies in schools and the limited use of these resources – a paradox that Cuban et al. (2001) described as one of high access and low use. Weiss (2007) proposed that pedagogical models that advanced a seamless relationship between physical and virtual spaces were required for engaging learning communities in educational experiences that would better integrate in-class (physical) and out-of-class (virtual/online) activities. Weiss (2007, p. 83) commented:

The emerging pedagogy will need to be flexible enough … to incorporate the networks, technologies, and learning environments that students will be creating and bringing with them to the classroom.

In conclusion, Weiss (2007) promoted Kalantzis and Cope’s (2005) argument that it was time educators moved on from being transmitters of knowledge to instead become designers of learning environments. He suggested that teachers regularly configure and reconfigure physical and technological resources to create ubiquitous environments in which students were able to collaborate and create meaningful contextualized work.
Spatiality of schools

A number of human geographers, including Lefebvre (2008), Soja (1989), Massey (1999; 2005), and McGregor (2004a: 2004b; 2004c) contended that space should no longer be considered as just a physical enclosure or viewed as a fixed geometry defined by the co-ordinates of physical or material entities but as a social product created through interactions between physical and social aspects of the environment. Indeed, Massey (1999; 2005) asserted that space is constantly under construction and always being recreated. The construct of ‘spatiality’ (Massey, 1999; 2005; McGregor, 2004a: 2004b; 2004c) encapsulated notions regarding the social production of space. McGregor (2004a, p. 2) defined spatiality as “the production of space through the interaction of the physical and the social” and suggested that spatiality could be utilised as a theoretical tool for examining relations and patterns of power or agency (McGregor, 2004b). She explained how the apparently innocent physical aspects of space were actually embroiled in acts of power through their participation in social relations.

McGregor (2004b) applied these ideas to researching spaces in schools. She explored the social and physical interrelations and interactions between students, teachers and other aspects of the physical environment. In her research she described how interactions and communications in schools were shaped and created by networks of objects (pens, paper, computers, furniture etc.) and people (students, teachers etc.). She associated ideas about the creation of socio-spatial networks with the creation of pedagogical contexts, which she proposed were generated by “network effects”. This referred to the many interrelations and interactions that occurred between people and objects, both within and beyond the school and across space and through time. McGregor described how context was increasingly emphasised in educational reform, but suggested that standard understandings of context, as either physical or social containers, failed to consider the reciprocal nature of the construction of spatiality.

Jacklin (2004) discussed similar ideas about the relationships between spatiality and pedagogy when discussing Lefebvre’s work. She contended that pedagogical practices were constantly being adapted to the constraints and affordances (Gibson, 1977) of both the material environment and the spatial practices of other people. She illustrated the complicated nature of these relationships as follows (Jacklin, 2004, p. 386-7):

... in schools, pedagogical practice must adapt to whether others are predictably present or absent, punctual or late and whether timetabled class periods will take place and be of predictable duration. It must take into account non-pedagogic routines that affect class time, such as the effects of bus boycotts, early Fridays closings, long assemblies and the expectation that classrooms be cleaned by learners. It must take into account the availability or
unavailability of a laboratory, blackboards, chalk, notebooks, pens, photocopies, textbooks, computers and libraries. It must take into account the penetration of the everyday rhythms of the lives of people beyond the school into the space of the school. And it must take into account the mandate on teachers to simply keep learners' bodies in order. The daily repetitive patterning of practice responds to these mandates. These patterns, or rhythms, bind the individual's practice elements and hold together this practice with its environment, and with the practices of others in that environment.

Such complicated patterns, or rhythms, appear somewhat bound by traditional school organisational structures. In a departure from such thinking, McGregor (2004b) suggested that the constant creation and recreation of spatiality provided opportunities for change in educational practice and pedagogies. She contended that the way “we see the world of the school has profound implications for the possibilities for reform and transformation of schools” (McGregor, 2004b, p. 368).

Chapter 6 contains further discussion of the work of Lefebvre (2008) and Soja (1989) concerning the social production of space and the application of these ideas to this research.

**Students’ geographic experiences at school**

Studies by human geographers including Jacobs and Jacobs (1980), Matthews (1992) and Fielding (2000) provided insight into the role that spatiality can play in creating effective learning contexts for students.

Based on research into students geographic experiences in primary schools in the UK, Fielding (2000) suggested that the role of space in schools should be more closely considered. He identified schools as ‘hot beds’ of moral geographies and suggested that schools had historically been places where moral codes dictated “how and where children ought to learn and behave” (Fielding, 2000, p. 231). furthermore, he suggested that the playing out of these codes continued to have a significant influence over children’s geographies and that their geographical experiences affected their use of physical space and their learning experiences. He believed that better understandings of the dynamics of children’s geographies could lead to significant improvements in pedagogic practices.

Earlier, Jacobs and Jacobs (1980) had considered similar issues and contended that the inclusion of students as managers of school spaces should become part of the school curriculum so that children’s spatial literacy may be developed, along with their ability to exert control over their environment. Matthews (1992) suggested that this was important because children gained
an understanding of their environment through diverse interactions with space and by interpreting and reconstructing their experience through personal, social and cultural lenses.

Fielding (2000) described unequal institutional power relations as having moulded the behaviour of school students for many years. He described the degree to which students were active participants in the use of space as being largely dependent upon the structuring of the teaching, learning and management within a school. He identified school settings in which the “geographic moral code” was negotiated by students and teachers as fostering collaborative learning practices, greater fluidity of movement around the classroom, a greater amount of on-task talk within groups and little pointing, leaning over or shouting. He also identified effective moral policing of classroom activity by students with students implementing negotiation skills to rectify problem situations when conflict arise before teacher intervention was required. He suggested that pedagogical practices based on negotiated moral codes could open up the classroom space for learning, encourage student movement, enable the fluid use of personal and classroom space and encourage students to move out of the classroom to pursue learning.

Fielding (2000, p. 236) also identified tensions between the “different moral geographies that different teachers [brought with them] to the same physical classroom space”. He described how students were required to adapt to the moral geographies introduced by individual teachers and how students responded to these geographies within their own geographic frameworks. He equated authoritarian derived pedagogy with a ‘much smaller classroom’, even through the physical space remained the same. With this reduction in classroom ‘space’, he suggested that students’ geographic experiences were being restricted. He described one such scenario:

[Students] sat scrunched up, leaning over their books, heads in their hands, or in front of their faces. Their movement and their communication was restricted so that peer evaluation was negligible. It was as if there was some physical barrier hemming them in on all sides, like they were in some moral enclave (Fielding, 2000, p. 237).

The relationship between the spatiality of schools and constructivist learning in the middle years – the research gap

McGregor (2004c) suggested that the significance of space had only recently become acknowledged in education. She claimed that only a few people within the education community were engaged in discourse regarding the impact of physical space on learning and even fewer were concerned with the influence of spatiality on learning. It appeared that broader consideration and understanding of the impacts that spatiality in schools had on students’ and teachers’
geographic experiences could enhance the capacities of schools to meet the learning needs of students.

Consideration of perspectives derived from the ‘spatial turn’ in the social sciences (Livingstone, 1995) was expected to assist investigation into the relationships between innovative learning environments, pedagogies and student engagement. Potentially, the creation of innovative learning environments and the development of new forms of spatiality in schools could provide a platform from which to improve students’ geographic experiences and their engagement in learning activities.

This study sought to advance understandings about how innovative learning environments might influence students’ and teachers’ geographies and students’ learning experiences, potentially revealing lessons concerning how space could be used to support constructivist pedagogical approaches.

**Contemporary approaches to the design of school learning environments**

In *Educational trends shaping school planning and design: 2007*, Stephenson (2007, p. 1) concluded that one of the fundamental responses to the changing needs of school users has been a realization that:

… “identical” school facilities do not translate into “equal opportunity” for students. While some students function measurably better in one kind of environment, others perform more effectively in another; the differences depend on student talents, abilities, and needs.

In response to these issues, Lippman (2007; 2010) recommended that learning environments should be designed as integrated systems that afford individual, one-to-one, small group, and large group activity settings. In addition, he suggested that students were more likely to construct knowledge for themselves and share their understandings with others when provided with environments that allowed for a flow of activity. Based on Lave and Wenger’s (1991) theory of situated learning, Lippman suggested that students engage in learning through a three level process: firstly, they observe and interpret the constraints associated with an activity (peripheral participation); secondly, they negotiate with other students to obtain understandings of the activity (guided participation); and finally they become fully engaged in the activity after obtaining understandings of how to participate in the activity (full participation) (see Figure 6 below). Based on findings from his research conducted in elementary schools in the United States, he suggested that the physical environment had an influence on the ability of students to move
through these levels of participation. He concluded that learning environments should be designed to promote peripheral, guided and full participation in learning.

Figure 6. Levels of engagement in constructivist learning activities (Lippman, 2010, p. 132).

Burke and Grosvenor (2008) also discussed responses to the changing needs of users. They suggested that an attitudinal shift was required so that schools would no longer be viewed as neutral or passive containers, but as active agents that shape learning experiences and promote a particular understanding of education. In School (Burke & Grosvenor, 2008), they described how physical spaces embodied a set of values and views about how teachers and students should act and engage in pedagogical encounters. They suggested that learning environments should not be simply technical solutions related to cost and supply, but careful responses concerned with the influence of the environment on education. They contended that each school site was “a compound of imagination, reaction, sedimentation or radical intervention in education” (p. 10-11), believing that it was “educational innovation that generates architectural progress in school building” (p. 24). In conclusion, they described the interconnectedness of progressive ideas in design and education as the key to good school design.

Along similar lines, Taylor (2009) suggested that when designing school facilities architects must respond not only to the number of students and teachers that are to be accommodated in various activity settings but to a deeper program that extended to the needs of users. According to Burke and Grosvenor (2008), even following a rigorous architectural programming process that was sympathetic to user needs, the preexisting attitudes and experiences of designers were likely to direct the project. They described how when a group of people collaborated on a school building project they generally engaged with the design process based on well established ideas about what they thought students and teachers should be doing. Burke and Grosvenor (2008, p. 10-11) concluded:
It is these [well established] ideas that create classrooms, situate corridors and locate specialist rooms, commons spaces and surrounding areas in particular ways. Apart from the usual limitations that result from planning regulations and local requirements, and in a much more fundamental way, the group’s collective experience acts as a limitation on its capacity to imagine a different educational future.

Dudek (2008) recognised that the adoption of contemporary ideas about pedagogical practices had motivated educators and architects to begin re-imagining how schools should be organised, configured and used. He commented:

The best new school builders recognise that education should lead architecture … the pedagogical vision is of fundamental importance when designing a new school. If it is to have a direct bearing on the contemporary needs of teachers, pupils and future generations of school users, it must reflect the parallel needs of children’s education and their social development in its design (Dudek, 2008, p. 9).

Dudek’s attitude regarding the importance of pedagogy as a key driver of school design was shared by Beare (2000a, p. 91), who stressed, “learning is the objective, not teaching or formal schooling or the creation of schools”.

Recent changes to learning environments: findings from two reports that have explored spatial innovation

Two significant reports produced in the UK in 2006-7 have provided insight into how learning environments are changing. These reports, Designing spaces for effective learning: a guide to 21st century learning space design (JISC, 2006) and Project Faraday: exemplar designs for science (DCFS, 2007), were each produced by large collaborative teams involving government bodies, universities, architecture firms and schools. The forward thinking design concepts produced by these projects are discussed below.

The Designing spaces for effective learning (JISC, 2006) report explored ideas associated with how space could motivate learners, support both collaborative and teacher led learning activities, provide personalised and inclusive environments, and be configured to flexibly respond to changing needs. The project focussed particularly on how ICT could be integrated into innovative spatial patterns. Although the report was created with learning environments in tertiary institutions in mind, it conveyed many ideas that were relevant to both primary and secondary school learning environments—including spaces suited to middle years’ students. The images below
(see Figures 7, 8, 9 and 10) are examples of the design concept drawings presented in the report.

Figure 7. General teaching space – concept drawing (JISC, 2006, p. 10).

The design concepts for general teaching spaces in the JISC report (2006) drew on the concepts of ‘pedagogy first’, ‘future-proofing’ and ‘tools fit for purpose’. In addressing the idea of ‘pedagogy first’, the report outlined the need for contemporary general teaching spaces to support teacher-led and student-led activities, including presentations, discussion, collaborative project work, and information retrieval and sharing. The report suggested that the needs of contemporary learners could be met using a number of different spatial models. These models included those where separate rooms could be allocated to different purposes and those where flexible open-plan spaces, or ‘learning centres’, could support a similar range of activities. The report concluded that the driving force behind such decisions should be defined by clearly articulated pedagogic goals devised by educators, rather than a general desire for innovation. The report also suggested that learning institutions must engage in productive dialogue if they were to effectively establish clear requirements for learning spaces when faced with changing pedagogic approaches. Finally, the report suggested that dialogue was essential for fostering staff ownership of spatial changes and
recommended that dialogue should be viewed as an investment in developing staff skills so that they could make the most of new learning environments.

In addressing the issues of ‘future proofing’ and ‘tools fit for purpose’, the JISC report (2006) outlined the essential nature of designs that could accommodate future technological and pedagogic developments. To address unknown future requirements, it suggested that investment should be directed towards higher specification mobile and wireless technologies rather than fixed technologies and furniture, as these models would facilitate relatively straightforward and inexpensive spatial reconfigurations in the future. Figure 8 (below) depicts the report’s general teaching space concept.

![General teaching spaces](image)

**Figure 8. General teaching spaces – concept details (JISC, 2006, p. 11).**
The JISC report (2006) also discussed the creation of ‘learning centres’. These were described as large environments that could absorb the functions of previously distinct spaces with the goal of supporting highly personalised learning experiences. The concepts of ‘form and purpose’, ‘the self-regulating building’ and ‘real and virtual spaces’ informed the design ideas for these learning centres. The report suggested that catering to ‘form and purpose’ was critical in environments where many different activities and associated behaviours were to be supported simultaneously. According to the report, multifunctional learning centres should be zoned in keeping with different activities, so that areas within larger spaces were identifiable to users and able to provide them with some direction regarding the types of activities and behaviours expected. The concept of ‘the self-regulating building’ further addressed the idea of spaces providing cues, or signals, to users regarding the affordances (Gibson, 1977) of different areas within a learning centre. The report suggested that the style and layout of furniture, the types and configurations of technology, and different noise levels all provided users with information that could help direct their actions and their use of space. Furthermore, it suggested that well designed learning centres should support areas where dialogue and collaboration were expected and encouraged, while simultaneously providing additional areas for silent study. Finally, the report suggested that ‘real and virtual spaces’ should be supported to co-exist. It identified the potential for individual, informal group and class-based learning experiences to be supported by virtual or online spaces and suggested that interaction between groups of various sizes and virtual/online environments should be addressed in the physical design. Figures 9 and 10 below depict the report’s learning centre concept.

Figure 9. Learning centre – concept drawing (JISC, 2006, p. 22).
The *Project Faraday* (DCFS, 2007) report set out to “promote innovative science facilities that could not only support 21\textsuperscript{st} century approaches to learning and teaching but also inspire teachers and learners themselves” (p. 5). The project’s objective was to design exemplar spaces for science education that could accommodate recent changes in pedagogical practices. Work was undertaken by collaborative project teams in 12 schools. This led to the design of spaces that were “more flexible and better suited to personalised learning than traditional science facilities with labs and labs alone” (DCFS, 2007, p. 17). Although focussed on the design of secondary school science facilities, the design concepts presented in the report conveyed many ideas about the future of learning environments in general – particularly associated with how design could support learning that involved hands-on activities and the use of ICT.
The DCFS (2007) report identified the need for spaces that could support small group work (e.g. informal seating around tables or practical areas for small groups), individual study (e.g. ICT stations) and large group presentations and discussions. In order to create learning environments that could support this range of spaces, the project teams explored three types of versatility: agile, flexible and adaptable. The report defined these as follows:

- **Agile** – immediate, giving staff and students control over their environment, for example by providing power and data services wherever they may be needed.
- **Flexible** – short term, allowing areas to be varied from day to day to suit activities, perhaps by sliding back partitions between two spaces.
- **Adaptable** – long term, where building construction and servicing don’t restrict changes in response to new learning methods or pupil numbers (DCFS, 2007, p. 21).

These three approaches to versatility were considered in connection with how school communities were expected to adapt to new learning environments. The project teams anticipated that school inhabitants would more readily adapt to gradual spatial change rather than to sudden substantial changes to the environment. Therefore, they designed facilities that catered for transitional periods to enable students and teachers to progressively develop their practices and change their environment to suit their needs. The following example (see Figure 11) shows how the learning environments at Joseph Rowntree School, New Earswick, UK, were expected to adapt as teaching and learning practices evolved. The process of adaptation was expected to progress as follows (DCFS, 2007, p. 23):

In the first year patterns of use are familiar to most teachers and students. The studios are mostly used separately, with the occasional opening of a sliding wall for shared teaching on science theory. In the third year, there’s greater transformation, with studios open for most of the time and partitions between classrooms and atrium removed for a large, flexible theory space. In the seventh year, the whole floor becomes an open plan ‘learning common’, with activities clustered around settings within the space, separated from a central demo area by moveable furniture with ICT docking areas for writing up.
Figure 11. The adaptable design of the facilities at Joseph Rowntree School, New Earswick, UK (DCFS, 2007, p. 23).

The DCFS (2007) report acknowledged the potential for current educational trends, such as exploratory and collaborative learning, to fall from favour in the future and in this event schools could revert to more traditional practices and spatial configurations, such as depicted in the ‘Year 1’ model shown in Figure 11 above.

The DCFS (2007) report also discussed design concepts that could support movement between indoor and outdoor learning environments and thus enable school grounds to be used as learning resources. In addition, the projects’ exemplar designs were intended to support learning beyond the school. The integration of ICTs, such as video conferencing facilities, were expected to enable students and teachers to link with other organisations around the world to enrich learning experiences through connections with other school communities and expert scientists.
The following floor plan (see Figure 12) provides an example of one of the exemplar designs created by a Project Faraday team. This floor plan, for a facility at Abraham Guest School, Wigan, UK, incorporated many of the concepts discussed above. The educational vision that informed this design was one of personalised, learner-centred education in which small groups of students would plan activities and then implement them. A time structure that allowed students to work on projects for half days was integral to the design and the teachers were expected to provide support and mentoring to the students. The spatial design was intended to cater for a range of teaching styles and was expected to be able to adapt in response to future changes in pedagogical approach.

Figure 12. Design proposal for Abraham Guest High School, Wigan, UK, science facility (DCFS, 2007, p. 39).
A brief history of school design beyond the classroom

The ‘open plan’, or ‘open space’, schools of the 1960s and 1970s constituted the first significant architectural departure from the traditional double-barrelled, or egg-crate, buildings common to schools across the world since the development of the ‘classroom’ during the Industrial Revolution (Weinstein, 1979; Lackney, 1998; Rodwell, 1998: Brogden, 2007). In some countries, including Australia, Britain, Canada, USA (Beck, 1980; Rodwell, 1998) and Israel (Klein & Eshel, 1980), open and interconnected spaces replaced traditional classrooms as the preferred learning environment during this time. However, the development and popularity of open plan schools was short lived.

The open plan school

From the mid 1960s through until approximately 1980, educators and architects engaged in a process of rethinking how schools should be socially organised and spatially configured. This period of innovation followed nearly two centuries during which the factory production-line metaphor had informed not only the design of school curricula, pedagogies and assessment practices, but also the design of school buildings. Prior to the mid 1960s, the ‘classroom’ had been almost exclusively accepted as the fundamental organisational unit of the school, following its creation during Industrial Revolution (Lackney, 1998).

Driven by education and social reforms, the development of open plan schools during the 1960s and 1970s was a significant attempt to change the physical nature of schooling. At this time, academics and educators called for new pedagogies and spaces which could support individualised learning (Lackney, 1998) and facilitate improved interaction between teachers and students (Weinstein, 1979). Educational philosophies related to experiential and democratic education, such as those advocated by educational luminaries Dewey (1966; 1971) and Friere (1970; 1973), informed this wave of innovation.

The concept of the open plan school was popularised by the Educational Facilities Laboratories (EFL) in the USA (Marks, 2009). This organisation promoted spatial configurations that were designed to be “simple, open, and flexible” (Gross & Murphy, 1968, p. 7). Typically, open plan classrooms were spaces that catered for large cohorts of students and team teaching approaches. These spaces were commonly composed of a variety of activity settings, including general learning spaces, withdrawal spaces, wet areas, quiet areas and covered outside work spaces. New furniture designs, including mobile dividers, acoustic screens, chalkboards and tables were also introduced to facilitate flexible social arrangements (Rodwell, 1998).
According to an EFL report (Gross & Murphy, 1968), open plan schools were not intended to dictate any particular instructional pattern or technological system. Rather they were expected to be highly responsive to the educational objectives of those using them. Gross and Murphy (1968, p. 7) described the design intentions behind open plan schools as follows:

[Open plan classrooms] can accommodate the conventional self-contained classroom program if that is called for – but they do not lock the user into that pattern, if a different approach commands itself now or later on … In short, these designs give freedom to teachers, administrators, and students.

The open plan classroom phenomena crossed international borders and, for a time, was widely acknowledged as best practice school design in a number of westernised countries – including those listed above. In Australia, the open plan design concept was interpreted differently in its states and territories. In South Australia open plan primary schools were notable for their very large open spaces, often equivalent in size to eight traditional classrooms. These spaces frequently had no partitioning between teaching areas and presented users with limited opportunities for visual or acoustic separation. In Queensland, New South Wales and Victoria, smaller spatial units were normal. In these states, open plan schools were often comprised of spaces of a size comparable to two conventional classrooms. In Tasmania, the Australian Capital Territory and the Northern Territory a variety of spatial configurations were constructed, while in Western Australia open plan school models were characterised by clustered spaces equivalent in size to six traditional classrooms. The Western Australia models could be divided into smaller spaces by drawing partitions into three pairs or six individual units (Angus, Evans & Parkin, 1975). Figure 13 (below) depicts the 1970s open plan school model for primary schools in Western Australia.
The influence of the open plan schools movement faded during the late 1970s and by the 1980s the traditional 'classroom' had once again became the favoured organisational and spatial unit in schools in Australia and around the world. When discussing the 'failure' of open plan school design, Angus, Evans and Parkin (1975) suggested that more radical changes to school design may have had a greater influence on educational practices if learning environments had been created that forced teachers to adopt different grouping arrangements. However, they concluded that, there would be “no guarantee that the practices would be for the better unless teachers adopt[ed] them for professional reasons and of their own choice” (p. 34).
In the United States, Weinstein (1979) identified negative parental responses to open plan schools as a significant factor that led many schools to modify open plan facilities by erecting walls, so as to make them “almost indistinguishable from traditional egg-crate schools” (Weinstein, 1979, p. 594). Similarly, Rodwell (1998) reported that school communities in Australia frequently resorted to modifying open plan schools by erecting walls, an occurrence he attributed to a mismatch between space and educational practice. Gump (1980) and Brogden (2007) also reported that the educational programs conducted in open plan schools often did not match the intentions of the architecture. They both suggested that educators did not take advantage of the potential of the spaces in open plan schools and believed that open plan design failed because teaching methodologies did not keep pace with architectural innovation. Brogden (2007) attributed this to the conservatism of teachers and the propensity of centrally imposed ideas to fail.

*The influence of the Educational Facilities Laboratories*

The EFL’s approach to school design and the educational ‘climate’ during the period when the organisations work was most influential was described by Gross and Murphy (1968) in *Educational change and architectural consequences: A report on facilities for individualised instruction*. They described how the EFL’s spatial configurations were intended to support individualised learning experiences and how open plan spaces were intended to support team teaching and the use of new communications technologies, such as television, language laboratories, overhead projectors and ‘new sophisticated AV information retrieval systems’. In addition, they described how individualised learning programs could be developed for each student through offering a wide range of learning experiences. They suggested that curriculum should be designed to ‘feed curiosity’ and ‘reward initiative’ and that the provision of a wide range of resources and a flexible time schedule could support both formal subjects and the personal interests of students. Gross and Murphy (1968, p. 14) concluded:

> The wealth of new options in designing a school program must be considered with this focus: how in a particular situation and with the available resources, can each individual student be given a set of experiences which will best facilitate his own learning. The whole way of thinking about school programming thus undergoes a transformation: rather than thinking first of uniform classes, teachers, texts, class periods, curriculum units, and grades, the innovating educator thinks first of the individual student and the wide variety of options – of modular units of time, space, personnel, and materials – at his command.

In translating these ideas into spatial configurations for middle school students, the EFL promoted the grouping together of related disciplines – including science/maths, music, arts, communications, languages, and humanities – in large open, barnlike, areas. The EFL suggested that each of these discipline areas should be located around a central learning-resource centre.
(library), within which each student should have access to a carrel and storage space. Within the areas assigned to each discipline area they proposed a minimum of dividing walls and the facilitation of movement between locations set aside for particular learning experiences. They suggested that only noisy activities, such as woodwork, should be acoustically contained behind closed doors (Gross & Murphy, 1968). Figures 14, 15, and 16 (below) illustrate the EFL’s middle school design concepts.

Figure 14. The middle school (Gross & Murphy, 1968, p. 57).
Figure 15. The science/math barn (Gross & Murphy, 1968, p. 59).

Figure 16. The arts barn (Gross & Murphy, 1968, p. 61-62).
Gross and Murphy (1968) described these concept plans as intended to help school communities overcome the ‘handicap’ that the classroom had placed on educational innovation and suggested that these concepts provided new ideas about how schools could be socially organised and spatially configured.

The following floor plan (see Figure 17) shows how similar design concepts were incorporated into a primary school in Rokeby, Tasmania during the 1970s. A variety of spaces clustered around a central library can be seen.

![Figure 17. Floor plan Building 2B Rokeby Primary School (Architect unknown – plan acquired from the school).](image)

The influences of open plan schools on environment-behaviour relationships

In 1979, Weinstein (1979, p. 603) wrote:

Hopefully the next decade of research on environment-behaviour relationships will not only rival the last in terms of productivity, but will also surpass it in sophistication and relevance to the real world of schools.
The timing of Weinstein’s comment coincided not only with the decline of the open plan school but also with the end of a period of heightened academic interest in the influences that different spatial configurations in schools could have on the attitudes and behaviours of students and teachers. In particular, the end of the 1970s saw a dramatic decline in research focussed on environment-behaviour relationships in schools. The research conducted prior to this decline, however, provided insights into how open plan learning environments could influence the social settings in schools. Some of this research is discussed below. It revealed that open plan spaces could influence students’ and teachers’ attitudes and behaviours – although some of the research findings were somewhat ambiguous and occasionally contradictory.

Barker and Gump (Barker & Gump, 1964; Gump, 1974; 1980) conducted some of the more enduring research associated with environment-behaviour relationships in schools. They developed and used behaviour settings theory to assess the influence that units of the environment could have on people’s behaviour (see Chapter 3 for a discussion of behaviour settings theory). They applied this theory to behaviour settings found in schools of both open and traditional architecture and found that open plan schools did not necessarily lead to changes in instructional programs, as they had expected. They concluded that open plan architecture did not readily influence pedagogical practices. Angus, Evans and Parkin (1975) similarly concluded that particular pedagogical approaches did not automatically match with particular school designs. Gump (1974) found, however, that open plan schools facilitated more frequent interaction between students and teachers and enabled students’ and teachers’ greater freedom of movement than traditional classroom environments, and that highly able students demonstrated higher self-esteem in open plan environments, while less able students showed lower self-esteem in the more open spaces (Gump, 1980).

In earlier research, Meyer (1971) had found that students felt more autonomous in open schools, while Traub, Weiss and Fisher (1974) found that students in suburban open plan schools showed greater autonomy, more liking for school, and more positive attitudes towards themselves than students in traditional classrooms. These findings were confounded, however, by the fact that they were not consistent for students in inner-city open plan schools.

With regard to teachers, Meyer (1971) reported that teachers interacted more amongst themselves in open schools while also feeling more autonomous and more satisfied with their work. Similarly, Pritchard and Moodie (1971) reported that teachers enjoyed teaching in open plan schools in preference to traditional classrooms. Weinstein (1979) warned that findings of this nature should be viewed with caution, however, due to the problem of teacher ‘self-selection’—teachers were choosing to teach in open plan schools because it suited their teaching style. She suggested that this may have resulted in findings that were not representative of a response from
a cross section of teachers. Rodwell’s (1998) finding that some teachers became confused in their educational roles when open school architecture was imposed upon them by bureaucrats indicated that spatial changes were not suited to all teachers or those with particular teaching styles. Beck (1980) suggested that educational programs suffered in situations where open plan architecture was imposed. He concluded that with better support for staff in these schools the open plan school movement may have been more successful.

Regarding the influence of different spatial configurations on students’ academic achievement, George (1975) and McPartland and Epstein (1977) both suggested that little evidence existed to indicate that academic achievement was different between students attending open plan schools and those attending schools with traditional classroom settings. On the other hand, Beck (1980) found that students in open plan schools scored lower on basic skills tests than students in traditional classrooms. He concluded that these findings were confounded, however, because of the way open plan buildings had been imposed on school communities without adequate preparation and support being provided for the teachers working in them.

When summarising the literature regarding the relationships between students academic performance and spatial configurations, Weinstein (1979, p. 598) concluded that it was risky to attribute differences in achievement to the physical environment, when differences “may actually reflect differences in educational program, teacher characteristics, or any of a host of other variables which may be unrelated to the physical environment”. On the other hand, she suggested that considerable evidence existed to indicate that the physical environment could affect ‘non-achievement’ behaviours and attitudes. She identified connections between more ‘humane’ spaces and better attendance, greater participation, and more positive attitudes towards the class, the instructor, and classmates. In addition, she identified high levels of student density with dissatisfaction, decreased social interaction, and increased aggression on the part of students. In summary, Weinstein (1979, p. 599), concluded that “it is possible that more positive attitudes and behaviours may eventually result in improved achievement” but that ‘solid proof’ remained a distant goal.

The relationship between school design and contemporary approaches to middle years’ education – the research gap

This brief discussion of research findings from the 1970s indicated that trying to understand how the physical environment influenced teaching and learning often involved researching highly complex relationships between physical, social and cultural factors. Over thirty years ago, Weinstein (1979, p. 599) called for researchers to “not only acknowledge the complexity of
environment-behaviour relationships but also to design and interpret studies to reflect this complexity”. She identified the relationship between physical design and educational programs as a neglected area of research and called for more researchers to explore how physical factors and educational programs interacted. She hoped that research-based guidelines could be produced to assist educators and architects when creating new educational settings.

Because traditional classrooms have tended to support didactic teaching approaches and students’ passively receiving information (McGregor, 2004a), the continued practice of educating middle years’ students in these learning environments may have limited their opportunities to learn via the constructivist approaches recommended by middle years’ researchers. Spatial confinement, limited options for the arrangement of furniture and restricted access to information sources may all have limited students’ opportunities to engage in higher order thinking (Bloom et al., 1956) and form new knowledge and understandings via a range of information sources, experiential activities (Dewey, 1966), interpersonal relationships, (Vygotsky, 1986), learning modalities (Gardner, 1993; 1999), and authentic tasks (Newmann et al., 1996).

Since the demise of the open plan schools ‘movement’ in the late 1970s, not only has there been limited design innovation, but also limited research concerning the physical environment and environment-behaviour relationships in schools. Only recently (since the early 2000s) have educators and architects again questioned the validity of the traditional classroom and begun to explore how innovative spaces in schools might better support learning.

Informed by the body of research on middle years’ education and student engagement that emerged since the late 1980s, this research project seeks to investigate the relationships between innovative learning environments, pedagogies and student engagement in order to better understand how learning environments might be designed and used to support the educational practices being promoted by middle years’ researchers.

Although the concepts that drove school design in the 1970s were remarkably similar to those which are informing school design today, a research gap opened during the period between the late 1970s and the beginning of the 21st century associated with the learning/space nexus. This research project seeks to investigate contemporary school design in Melbourne, Australia in order to try to better understand how fundamental changes to learning environments might influence the delivery of education programs. The project also seeks to understand how society’s attitudes towards education are currently being reflected in the physical spaces in schools in the state of Victoria.
The lack of understanding regarding how to design effective learning environments for contemporary society that was identified by Heppell et al. (2004) makes this research relevant at a time when government funding schemes are financing school building projects across Australia and schools are trying to transform their middle years’ educational practices.
Chapter 3: Methodology, methods and data analysis

Introduction

In this chapter I discuss the design of the research project to provide some transparency (Mattsson & Kemmis, 2007) regarding how the research was carried out and on what grounds the findings from the research are claimed. I outline the epistemology, ontology and theory that informed the study’s design, the methodology and data collection methods that were employed and how field-data was analysed. In the later part of the chapter, the suitability of the study’s design for the purposes of answering the research questions is discussed and the limitations of the research approach are examined.

An overview of the design of the study is shown in the following diagram (see Figure 18).

Figure 18. Design of the study.
**Epistemology and ontology**

The methodology and methods chosen for the study were informed by interpretivist (Bryman, 2004) and critical (Carr & Kemmis, 1986) epistemologies (theories of knowledge). Initially, I adopted an interpretivist approach so that understandings of the social settings under investigation could be developed through the eyes of social actors (school leaders, teachers and students). The adoption of an interpretivist approach required the acceptance of value-mediated findings and a subjective view of the social settings under investigation (Cohen, Manion & Morrison, 2007).

Underpinning this interpretivist epistemological position was a constructionist ontological position (Bryman, 2004). Such ontology asserts that social phenomena and their meanings are continually being accomplished by social actors and are in a constant state of revision (Bryman, 2004). Framing the study in this way enabled the research to be informed by the perspectives and opinions of the social actors/participants/co-researchers who took part in the study.

The adoption of an interpretivist epistemological position distinguished this project from other studies that investigated connections between learning and space during the 1990’s and 2000’s. During this period, a number of the studies adopted positivist approaches and employed quantitative methods. These studies often linked students’ academic performance to the condition of school buildings (Fisher, 2004) or to capital expenditure on school buildings (McGregor, 2004). For example, Schneider (2002) reviewed literature associated with the impacts of air quality, ventilation, thermal comfort, lighting, acoustics, building age, school size, and class size on student’s academic performance.

I believed an interpretivist approach was appropriate for addressing the research questions asked in this study because it was in keeping with the study’s focus on the relationships between innovative learning environments, pedagogies and student engagement. Positivist approaches, which strive for “objectivity, measurability, predictability, controllability, patterning, the construction of laws and rules of behaviour, and the ascription of causality” (Cohen, Manion & Morrison, 2007, p. 26), were deemed less appropriate in this instance.

The decision to complement the interpretivist approach with a critical epistemological position was made to negate some of the weaknesses that a purely interpretivist approach may bring. Carr and Kemmis (1986) suggested that an interpretivist approach may fail to recognize that many of the objectives that social actors pursue do not arise from their conscious choice, but are alternatives that they pursue due to the constraints of the social structures within which they are
situated. The adoption of a critical approach benefitted the study by helping to identify the constraints that were imposed on social actors by the social structures around them.

**Middle range theory**

In keeping with the critical epistemological position, the design of the study was further informed by critical social theory (Habermas, 1971; 1974; 1989; Ewert, 1991; Leonardo, 2004). Ewert (1991) described critical social theory as a multidisciplinary knowledge base that draws on the disciplines of philosophy and science. Further to this, Leonardo (2004) described critical social theory not as a traditional discipline as such, but a convergence of existing disciplines from within the social sciences.

A critical social theory approach to understanding the social world promotes the critique of social settings with the intention of facilitating social change by social actors via emancipatory praxis (logical action based on reflection). Critical social theory suggests that through trying to change a social setting, the nature of its social context may be revealed and understandings of its function and potential may be attained.

Habermas (1971; 1974; 1989), a German philosopher, is credited as the founder of critical social theory, although its roots can be found in the work of others (Scott, 1978; Ewert, 1991). Critical theory, a precursor to Habermas’ critical social theory, was developed by the Frankfurt School (Institute of Social Research at Frankfurt) as an approach to understanding the social world. Adorno, Fromm, Horkheimer and Marcuse all made prominent contributions to this theory (Cohen, Manion & Morrison, 2007), which drew on the earlier works of Kant, Marx and Freud (Scott, 1978; Leonardo, 2004).

Utilising a process of critical reflection, critical theory was devised to enable social actors to realise their position in society and to promote their participation in social change through rational actions (Scott, 1978). Habermas’ advance on the Frankfurt School’s critical theory can be seen in the connection between critical social theory and the ‘practice of social change’. Whereas “critical theory tries to understand why the social world is the way it is and, through that process of critique, strives to know how it should be” (Ewert, 1991, p. 356), critical social theory takes this process a step further by exploring knowledge derived from periods of change, or emancipation. Habermas’ theory goes beyond critical theory in that it identifies the actions or processes of social change as a source of revealing of the true nature of a social setting.
In support of Habermas’ approach, Scott (1978, p. 4) described how a critical social theory approach to understanding the social world may expose “ideologically frozen relations of dependence” as people become aware of their positions as “active, yet historically limited subjects” and try to implement changes to improve their situations. He explained that research informed by critical social theory may direct social actors to participate in emancipatory praxis and through this participation they may become more fully aware of their situations.

Although scholarly discussion regarding the methodology and application of critical social theory is ongoing (Leonardo, 2004), it is well recognised and widely applied in research concerned with the nature of social settings. A critical social theory approach to research can target institutional arrangements and the ways people create such systems as a means of liberating social actors from hidden coercion and its potentially harmful effects (Leonardo, 2004). Consideration of social justice plays a significant role in the application of this theory. It provides a means by which social injustices may be identified and addressed. That is not to say that critical social theory can provide answers to issues of injustice or inequality. Rather, it may be used as a lens through which to identify appropriate questions regarding injustices or inequalities—questions that may subsequently be interrogated and acted upon (Leonardo, 2004).

In the context of education and schools, critical social theory has been identified as an influence on the works of prominent educational theorists such as Dewey (1940; 1961; 1966) and Freire (1970; 1973), both of whom made significant contributions to the development of a discourse on critical pedagogy (Leonardo, 2004) (see Chapter 5). Carr and Kemmis (1986) identified critical social theory as a theoretical perspective that legitimised the adoption of action research and advocated this perspective as the most rational way to think about research in education. They suggested that critical educational research should aim to transform education, rather than merely attempt to explain or understand moments in the transformative process (as is characteristic of positivist or purely interpretive educational research). Carr and Kemmis (1986, p. 156) described the role of critical research in education as follows:

A critical educational science … has a view of educational reform that is participatory and collaborative; it envisages a form of educational research which is conducted by those involved in education themselves. It takes a view of educational research as critical analysis directed at the transformation of educational practices, the educational understandings and educational values of those involved in the process, and the social and institutional structures which provide frameworks for their action…critical educational science is not research on or about education, it is research in and for education.

Critical social theory has also been applied as a theoretical approach to research concerning architectural space. Eminent social theorists, including Foucault (1975; Leach, 1997), Soja (1989)
and Lefebvre (1991a; 1991b) have discussed critical social theory in reference to space. Their perspectives on the relationships between social life and space are discussed in Chapter 6.

**Design of the study**

The methodologies and data collection methods selected for the study were informed not only by the theoretical perspectives discussed above, but also by the research questions (see Chapter 1). To facilitate the development of new understandings regarding the relationships between innovative learning environments, pedagogies and student engagement, the study investigated the lived experience of school leaders (principals, associate principals, assistant principals and leading teachers), teachers and middle years’ students as they participated in transformative and emancipatory processes directed at updating their physical learning environments and pedagogical practices.

Using the methodologies and data collection methods described below, fieldwork was conducted over a two year period between September 2008 and September 2010.

For details of all data collection events see Table 4 in Chapter 4.

**Methodology**

*Interdisciplinarity*

Due to the breadth of the subject matter under investigation, an interdisciplinary perspective on the research was considered essential. As different epistemologies tend to be favoured by different disciplines, an interdisciplinary approach was expected to facilitate the creation of new knowledge regarding the socio-spatial and socio-pedagogical relationships that were central to the research questions. By investigating the research questions from a perspective that integrated concepts and theories from a number of academic disciplines (see ‘Theorising phase’ below) I anticipated that new understandings of the relationships between innovative learning environments, pedagogies and student engagement would unfold.

Eigenbrode et al. (2007) concluded that the integration of disciplines in interdisciplinary research can be achieved through the unified identification of problems and the sharing of research methods across disciplines. In addition, Thompson Klein (1996) suggested that interdisciplinary research is often supported by projects of an applied nature. These traits of interdisciplinary
research were adopted in this project. In particular, the decision to employ the social research methods that I describe below was made because researchers in the study’s principal disciplines of education and architecture have applied such methods to investigate a range of issues associated with impacts on human subjects.

Miller et al. (2008) recommended that interdisciplinary research should not favour any one discipline. Therefore, a concerted effort was made to establish and maintain the interdisciplinary nature of the research throughout the project. Interdisciplinarity was supported by discussion with members of my supervisory panel, whose backgrounds included architecture, education, education planning, sustainability, urban design and sociology. In addition, my own academic background in agricultural science and education, and the conduct of this PhD within a faculty of architecture, building and planning, further supported the interdisciplinary nature of the research.

**Theorising phase**

Capitalising on the work of Fisher (2002), which was founded on critically theorising the places and spaces of schools through the disciplines of sociology, pedagogy, ecological/environmental psychology, architecture, geography and cultural theory, I sought to pursue understandings of the relationships between innovative learning environments, pedagogies and student engagement through a somewhat derivative approach. I expected the integration of some aspects of Fisher’s (2002) interdisciplinary methodology would help maintain the interdisciplinary nature of the study and provide a range of perspectives from which to ‘make meaning’ of the field-data collected.

During the first year of the study (2008) I engaged in the major theorising phase of the project. This phase focussed on exploring literature from fields of study that were expected to encourage enlightened thinking regarding the research questions. I explored theories and concepts from the fields of education, architecture, human geography, sociology, ecological/environmental psychology, cultural theory and complexity science. This literature-based research was conducted for the purpose of identifying theoretical frameworks that could be used to inform the design of the study (i.e. critical social theory – as previously discussed) and the subsequent analysis and interpretation of the field-data.

In keeping with the critical epistemological position that informed the study, the following domains/disciplines were explored and ultimately provided lenses through which to analyse and interpret the field data: critical pedagogy (Freire, 1970; 1973; Giroux, 1985); critical theory of space (Soja, 1989); critical human geography (Foucault, 1972; Lefebvre, 1991; Lees, 2001; Fisher, 2002; Hirst, 2005); social meanings of space (Bailey, 1975); behaviour settings theory (Barker, 1968); complexity theory (Heylighen, Cilliers & Gershenson, 2007); and complex
adaptive systems theory (Law & Urry, 2004). Details of these theoretical frameworks are provided in Chapters 5-7.

**Case study methodology**

As schools are highly complex social settings influenced by numerous agents, I employed an overarching case study methodology in order to investigate the research questions in the field. This approach ensured that the field-work phase of the study was appropriately bounded. Yin (2003, p. 23) defined a case study as:

... an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomena and context are not clearly evident.

Brown (1992) advocated the use of case studies in educational research. He suggested that although some aspects of schooling are sometimes treated as independent, they are in fact synergetic and form part of a systemic whole. In support of case study research in schools, Brown (1992, p. 141-142) concluded that:

It is impossible to change one aspect of the system without creating perturbations in others ... it is difficult to study any one aspect independently from the whole operating system.

In keeping with Brown’s ideas about case study research, Flyvbjerg (2004, p. 429) described a case study approach to social research as being concerned with the production of a ‘thick’ narrative. He suggested that:

Good narratives typically approach the complexities and contradictions of real life. Accordingly, such narratives may be difficult or impossible to summarise into neat scientific formulae, general propositions, and theories ... This tends to be seen by critics of the case study as a drawback. To the case-study researcher, however, a particularly ‘thick’ and hard-to-summarise narrative is not a problem. Rather it is often a sign that the study uncovered a particularly rich problematic.

Based on the idea that schools function as complex systems and should be studied as wholes, I chose to conduct field-based research in three schools (for details regarding these schools see Chapter 4). The schools selected were considered to be different sites within a single case study approach to the research. This form of case study was described as a multiple case study by Bryman (2004) and Thompson (2005) and as a collective case study by Stake (2000). In discussing this approach, Thompson (2005, p. 94) noted that:
... a multiple case study approach should not be confused with other case studies such as a comparative case study (Merriam, 1998) ... [a multiple case study does not] compare analyses from one case to the next, but uses one case to provide an interpretive context for the others (Chow-Hoy, 2001).

The use of three different sites within a multiple case study framework strengthened the research through space triangulation (Cohen, Manion & Morrison, 2007). This approach overcame the potential problems associated with conducting research within a single culture or sub-culture. The data collected across the three sites was collectively analysed to develop more generalizable and trustworthy (valid) findings. Importantly, the multiple case study approach enabled both ethnographic (Hammersley, 1999; Bryman, 2004) and participatory action research (PAR) (Kemmis & McTaggart, 1992; Cohen, Manion & Morrison, 2007; Mattsson & Kemmis, 2007) methodologies to be employed.

**Ethnographic methodology**

During the initial months of the field-based research an ethnographic methodology (Hammersley, 1999; Bryman, 2004; Barab et. al., 2004; Gay, Mills & Airasian, 2006; Cohen, Manion & Morrison, 2007) was used to investigate and attain understandings of the enduring social settings at each case study site (school). I expected this phase of the research to be of limited duration and to cease once the PAR phase of the study was initiated. However, during the course of the fieldwork it became apparent that ethnographic techniques would be needed throughout the study in order to document ongoing socio-spatial and socio-pedagogical changes at each of the case study sites.

When conducting ethnographic research in each school, I explored the socio-spatial settings and socio-pedagogical cultures that I encountered using an approach described by Hammersley (1999) as interactionist ethnography. He described this as being concerned not with “what is assumed to be going on, what ought to go on, or what must be going on” (Hammersley, 1999, p. 2) but with what is actually going on – albeit through a subjective lens. Hammersley (1999, p. 2) commented:

The emphasis of interactionist ethnography in education is on researching the experience, perspectives and actions of those involved: teachers, children, students and others...The interactionist idea that people construct their perspectives about the world and build lines of action on the basis of these, rather than simply responding to events in a passive way, has recently been reinforced by the influence of feminism and postmodernism, with their heightened concern for the role of self and their stress on the social construction of cognition, motivation and action.
The ethnographic aspects of the research focused on: why schools wished to create innovative learning environments; the design processes that resulted in the creation of innovative learning environments; observation of teachers and students adapting their pedagogical practices to make use of innovative learning environments; and investigating the influence of innovative learning environments on pedagogical practices and student engagement.

**Participatory action research methodology**

Following several months of ethnographic research at each of the case study sites I began collaborating with members of each school community on PAR projects (Whyte, 1991; Kemmis & McTaggart, 1992; Cohen, Manion & Morrison, 2007; Mattsson & Kemmis, 2007). These projects investigated issues that were collectively identified during the initial ethnographic phase of the study.

Kemmis and McTaggart (1992, p. 16) identified PAR as being "concerned equally with changing individuals [as well as] the culture of the groups, institutions and societies to which they belong". Furthermore, Bell (1999) described PAR as being particularly well suited to educational settings due to its practical, problem solving emphasis and because such research is directed towards greater understanding and improvement of social settings over a period of time. The PAR phase of this study involved collaborating with school leaders, teachers and students to investigate emergent issues related to the relationships between innovative learning environments, pedagogies and student engagement. This approach supported the recognition of deeper issues associated with these relationships. Figure 19, below, shows the framework that directed the PAR projects at each school.
Due to the iterative and non-linear nature of the change processes that occurred at each school, this framework was used more as a guide than as a rigid procedure. A brief description of each phase of the PAR framework/cycle follows.

1. **Issue identification**: form understandings of the social setting in its current state and create a vision for the future of the setting.
2. **Intervention design**: consider how the social setting could be improved to match the vision and subsequently design interventions.
3. **Intervention action**: implement interventions.
4. **Observation**: form understandings of the social setting during the process of changing the social setting (the emancipatory process) – potentially revealing hidden dependencies and assumptions made by social actors.
5. **Evaluation**: evaluate the social setting in its changed form.
6. **Reflection**: reflect on the changes observed.
7. **Repeat** all of the above as required (adapted from Cohen, Manion & Morrison, 2007).

It should be noted that when fieldwork began, each school was either participating in a process of procuring innovative learning environments (two schools) or had recently acquired an innovative learning environment (one school). Therefore, each school was already engaged in updating their physical environments and, to some degree, updating their pedagogical practices prior to the commencement of this study.
My role as the primary academic researcher in the PAR process involved working alongside members of each school community to further their initiatives. To this end, my contribution to the PAR mainly consisted of highlighting issues that had not been closely considered by my co-researchers (school leaders, teachers and students) and making suggestions regarding how their socio-spatial settings and socio-pedagogical cultures might be improved. I was also the primary recorder of the events that took place. Mattsson and Kemmis (2007, p. 203) described the role of the academic researcher in PAR as follows:

In PAR, the outside researcher might have the role of mentor and adviser to participants, helping out in a process of research initiated and controlled by the people involved.

Mattsson and Kemmis (2007) also suggested that the researcher may play a catalytic and supportive role, while being careful not to overly influence the direction of the research process to the extent that this is feasible.

The ongoing participation of the co-researchers in the PAR process was facilitated by focus group forums and workshops. At these events, school leaders and teachers were asked to reflect on past events and discuss emergent issues. As part of this reflective process, they were encouraged to develop new ideas about how to address the issues that had been collectively identified. The co-researchers were motivated to participate in these PAR projects due to their vested interests in the social settings under investigation. My ongoing interest as an academic researcher and the presence of the Smart Green Schools research team at a number of forums and workshops helped maintain the co-researchers’ high levels of participation. The time required of teachers and students to participate in the research was largely integrated into their normal daily practice. Any work teachers or students did as co-researchers’ was integrated into either professional development activities or the curriculum.

Mattsson and Kemmis (2007, p. 204), suggested that PAR projects may lead to the “development of particular types of competence or capacities among participants” and “contribute to the development of individuals’ or groups’ capacities for organisational and structural change”. In this project, the PAR phase of the study facilitated a dialogical process (Cohen, Manion, & Morrison, 2007) that furthered each school community’s understandings of their socio-spatial settings and socio-pedagogical cultures. Furthermore, it contributed to some significant spatial and pedagogic changes in the three schools. For details regarding the conduct of the PAR projects at each school see Chapter 4.
Data collection methods

Qualitative social research methods were used for the collection of data in the field. The specific methods used included participant observation (Bryman, 2004; Cohen, Manion, & Morrison, 2007; Gay, Mills & Airasian, 2006), semi-structured interviews (Kvale, 1996), and focus group forums (Bryman, 2004; Cohen, Manion, & Morrison, 2007). Two design workshops were also conducted. Using these methods, I was able to record data about the actions and opinions of school leaders, teachers and students who were involved in (a) creating innovative learning environments and (b) using these environments for pedagogical activities. In addition, I was able to assess students’ engagement within these spaces.

Participant observation (Bryman, 2004; Cohen, Manion, & Morrison, 2007; Gay, Mills & Airasian, 2006) involved observing lessons, staff meetings, professional development sessions, focus group forums and workshops. I recorded my observations of people’s behaviours and the things that they said, as narrative accounts, or unstructured observations (Bryman, 2004). In addition, I recorded personal reflective notes about the events that I witnessed. My observations of teachers and students in learning environments involved recording the ways they used their environment for pedagogical activities and the ways students engaged in learning (see below for details regarding the use of observational techniques to assess student engagement). Often, narrative accounts were recorded on the spot. When this was not possible, I recorded my observations within an hour or so of the events taking place.

Semi-structured interviews (Kvale, 1996) with school leaders, teachers and students addressed myriad issues associated with the design and use of innovative learning environments. In general these interviews addressed their perceptions and experiences of (a) their learning environments and (b) how they used their learning environments for pedagogical activities to support student engagement. In addition, some of these interviews explored their perceptions of the events that occurred during the PAR phase of the study. The questions that I asked during the interviews were largely based on the background literature and theoretical perspectives that informed the study (see Appendix 1 for examples of questions that were asked). These questions were organised thematically. Because of the semi-structured nature of the interviews I often asked questions in response to the answers that interviewees provided. These interviews were audio recorded and subsequently transcribed prior to analysis.

To promote students’ critical examination of their learning environments prior to interview, I had initially planned for each participating student to create a personal documentary (Barab, 2004) that detailed their perceptions of their learning spaces. However, because of constraints associated with limited time available within school curricula only five of the 15 students
interviewed completed the task. With support from their teachers and me, these five students (from School B) created short multimedia documentaries of 3-5 minute durations.

Involvement in this activity provided these students with time to consider questions about their learning environments and provided them with a medium through which to communicate their experiences. Their documentaries included photographs of students using their preferred and non-preferred learning settings and commentary about their perceptions, experiences and opinions of these spaces. The students who completed a documentary presented this to me prior to interview. The interviews that were conducted with the other ten students did not incorporate this documentary aspect.

Focus group forums (Bryman, 2004; Cohen, Manion, & Morrison, 2007) were attended by school leaders and/or teachers and/or students. These forums were held to discuss salient issues concerning the relationships between innovative learning environments, pedagogies, and student engagement. The majority of these forums focussed on issues pertaining to spatial and pedagogical change. Often these forums were used to clarify and reflect on issues that had been raised in earlier interviews or previous focus group forums. When possible these focus group forums were audio recorded and subsequently transcribed prior to analysis. In situations where this was not possible, notes were taken to record what was said.

Assessment of student engagement

Assessing student engagement within innovative learning environments was a key focus of the data collection process. The three engagement subtypes identified by Fredricks, Blumenfeld and Paris (2004), behavioural engagement, emotional engagement, and cognitive engagement (see Chapter 2), were used as a framework for this assessment. Data about student engagement was collected through observation and semi-structured interviews with students and teachers. Both of these methods have been used by other researchers to assess student engagement (Alvermann, 1999; Anderson, 1993; Blumenfeld & Meece, 1988; Helme & Clarke, 2001; Lee &; Guthrie & Wigfield, 2000; Lee & Anderson, 1993; Newmann, 1992; Stipek, 2002). It should be noted that the assessment of student engagement in this study was used as an indicator of the influences that both innovative learning environments and constructivist pedagogies may have on student learning.
The influence of the researcher on the social settings

In general, my presence in the case study schools during this ‘critical’ study was designed to catalyze the participation of school leaders, teachers and students in emancipatory praxis directed towards the physical learning environments and pedagogical practices. However, I adopted a low profile when observing lessons. My persistent presence in the case study schools over the longitudinal duration of the fieldwork appeared to minimize the ‘observer effect’, which Gay, Mills and Airasian (2006, p. 424) described as “the phenomenon whereby persons being observed behave atypically simply because they are being observed”. My frequent visits to the schools appeared to result in both teachers and students becoming comfortable with my presence. This eventuality was in keeping with Gay, Mills and Airasian’s (2006, p. 424) observation that “the effect of the researcher’s presence on the participants’ behaviour typically decreases over time”.

I was also conscious of the ‘Hawthorne effect’ (Brown, 1992) and its potential influence on the study. The Hawthorne effect describes how any intervention by researchers in a social setting tends to lead to positive effects on the setting due to the attention paid by researchers to the welfare of social actors. Although the Hawthorne effect may be undesirable in controlled variable experiments, any negative influences of this effect on this research were not of particular concern. Indeed, Brown (1992) advocated the positive contribution that the Hawthorne effect may have when with the presence of the researcher is intended to catalyze social change.

Identification of population and samples

In keeping with the case study methodology and the interests of the research project’s funding partners, samples were selected from a population of Victorian public schools. The populations of interest were composed of two related units of analysis, (a) innovative learning environments, and (b) groups of school leaders, teachers and middle years students. The adoption of the case study methodology ensured that both units of analysis were concurrently present and that the interactions between these units of analysis could be investigated. The identification of innovative learning environments was based on current literature about school building design and the opinions of the academic members of the Smart Green Schools research team.

Convenience sampling (Bryman, 2004) was used to select specific samples for investigation. The selection of schools with innovative learning environments was largely based on their availability (for details regarding the case study schools see Chapter 4). The identification of samples of school leaders, teachers and middle years’ students from within each school was also undertaken.
using convenience sampling. In each school, these sample groups were composed of 2-3 school leaders, 4-10 teachers and 50-75 students. Further convenience sampling from within these groups was employed to identify participants for interview and involvement in the PAR projects.

In the later stages of the fieldwork, a purposive sampling technique (Bryman, 2004) was used to target people who were thought to hold relevant information that had yet to be investigated. The sampling of students for interview was based on a stratification of this population: a mix of boys and girls were selected for interview.

**Ethical considerations**

Ethics clearance was granted for the study by The University of Melbourne Human Research Ethics Committee (Ethics ID: 0830699.1) and the Department of Education and Early Childhood Development (DEECD) (Victoria). As directed by DEECD, the case study school principals provided specific consent for the research to be conducted in their schools. The following measures were taken to minimise potential risks to participants in the project:

- Plain language statements and consent forms were provided to participants. These outlined the purpose and particulars of the project. Separate documents were created for school principals, teachers and parents/students. It was made clear that participation in this study was voluntary (see Appendix 2 for copies of the plain language statements and consent forms).

- Participants were given the opportunity to opt out of the research at any time and ask that unprocessed data that was previously supplied be withdrawn.

- As the researcher I was attentive to students’ developmental levels when seeking their consent to participate in the project. Parental consent was sought for each student.

- At least one teacher was always present (visual contact) when I was working with, or interviewing students.

- As the primary researcher I respected the needs of the students throughout the duration of the study and provided for the students’ safety, emotional and psychological security and wellbeing.

- The names of the case study schools and the names of participants were not used in the research findings. The schools and participants were referred to by pseudonyms in publications arising from the research.

- All primary data collected was stored at The University of Melbourne in a locked filing cabinet and a password protected PC.
- Data will be stored for a minimum of five years after the date of any publication or public release of the work of the research. Audio recordings will be disposed of in accordance to The University of Melbourne code of conduct for research.

**Analysis of data**

Spradley (1980) described the analysis process as a way of thinking and a search for patterns – a process that involved determining the parts, the relationships among parts, and their relationships to the whole. In this study, the analysis of data involved (a) an iterative search for novel theoretical insights and (b) theorising based of the background literature and theoretical perspectives that informed the study and (c) a search for patterns across the case study sites.

The search for novel theoretical insights was supported by collaboration with the participants/co-researchers (school leaders, teachers and students). Through the PAR projects at each case study site patterns were identified and novel theoretical insights were established regarding the relationships between innovative learning environments, pedagogies and student engagement. As previously discussed, reflection by participants/co-researchers during focus group forums and workshops significantly informed this iterative process.

My final analysis of the data was supported by the background literature and theoretical perspectives that informed the study. Data from observational notes, interview transcripts and summary notes from focus group forums and workshops was analysed using thematic narrative analysis (Riessman, 2008). This analytical approach is similar in some respects to grounded theory and interpretive phenomenological analysis, but distinguished from these techniques by the acceptance of prior theory as a theoretical lens or resource for interpretation (Riessman, 2008).

Bryman (2004) suggested that the term ‘narrative analysis’ may refer to a wide variety of approaches to seeking understandings associated with the stories that people tell, and described narrative analysis techniques as being sensitive to:

… connections in people’s accounts of past, present and future events and states of affairs; people’s sense of their place within those events and states of affairs; the stories they generate about them; and the significance of context for the unfolding of events and people’s sense of their role within them (p. 412).
With a focus on content, that is “what is said, written or visually shown”, Riessman (2008, p. 53), suggested that thematic narrative analysis can support researchers to develop theories based on the stories that are gathered. She concluded:

Thematic analysis can be applied to stories that develop in interview conversations and group meetings, and those found in written documents … stories can have effects beyond their meaning for individual storytellers, creative possibilities for social identities, group belonging and collective action (p. 54).

Gay, Mills and Airasian’s (2006) described the ‘analysis of narrative’ as a technique suited to producing descriptions, or statements, of themes found in individual cases. These themes, they suggested, may be applied to the analysis of the stories found in the narratives collected and ultimately collated to form “general knowledge about a collection of stories” (p. 435).

The thematic narrative analysis technique applied in this study was aligned with the critical epistemology that informed the research and the PAR methodology. Using a thematic narrative analysis technique adapted from Riessman (2008), the data from individual cases (observational notes, interview transcripts, and summary notes from focus group forums and workshops) was not fractured or segmented into thematic categories for cross analysis; instead, individual cases were maintained intact for coding. By preserving the data within each case in long chronological sequences, the finer details of the stories embedded in the data were able to be interpreted within historical contexts, with attention paid to both micro and macro contexts. The identification of micro contexts revealed isolated issues and events that shaped the social settings in the case study schools, while an exploration of macro contexts revealed some of the forces acting on the settings’ social structures—such as power relations, hidden inequalities, hidden dependencies and historical contingencies. Through the interpretation of individual cases, understandings of the socio-spatial settings and socio-pedagogical cultures within the case study schools were formed. These understandings were subsequently used as interpretive contexts for further investigation of the research questions.
Example of the coding and analysis process

The following excerpt from an interview transcript demonstrates how the data from each case (observational note, interview transcript, focus group forum or workshop summary) was coded. The initials ‘CP’ refer to Campus Principal and the initials ‘BC’ to me.

BC – So you have created a pretty big space up there – equivalent to four classrooms.

CP – Yeah.

BC – How did you see integrated curriculum being assisted by a larger space than the traditional classroom?

CP – First of all we wanted to create a point of difference. Something that physically looked and felt different to other spaces in the school and we also wanted to ensure that people were able to work in teams and the kids could work in groups, issue like problem solving and team work. Lead and to build that around a space that was varied and big enough to, to umm model the work that they’re doing and to allow that work to take place.

BC – So you don’t think you could have conducted the same sort of integrated studies in a classroom of two?

CP – No I don’t think so. You certainly don’t get that concept of team teaching operating as effectively.

BC – So that was a really important factor that there was the team teaching approach?

CP – Yeah absolutely yeah. I mean what we are trying to do is a school is develop a school, redevelop the school around the whole concept of teams from the top down, bottom up.

BC – How are you managing to... how are you putting the teams together? What are you basing the teams on?

CP – Are you talking specifically about the integrated curriculum or across the school?

BC – Well, perhaps specifies first.

CP – Yeah. With the integrated curriculum we have been trialing a few different methods but starting I guess with trying to get a range of skills into each team. So for example the curriculum is rich in ICT and so we would have someone with an ICT background. Umm...Initially and maybe blending that with someone with a maths/science type background and someone with an English/humanities background. Debate perhaps in the area...just trying to get a depth of experience and ability into the team. Umm...I guess we will refine that a little...and I guess starting with volunteers as well, people who chose or wanted to work in that space. And that’s been refined a little so we’ve...sure we still looking for volunteers but we try to refine that in terms of breadth of skill but we are also looking for compatibility and people who can work together and I guess demonstrate that they are team players, that they are willing to share curriculum and share ideas...

BC – So the collegiality between those people has been generally good? Or have you found some people that it hasn’t worked for?

CP – Oh look I think it has been uneven. I mean for example, in the early stages we had some passionate environmentalists writing environmental curriculum that perhaps hadn’t had a lot of classroom experience so when they look at their work actually on the ground, when it was actually in operation it wasn’t always as you dreamt it might be. And so it hasn’t always gone...we haven’t always had success with our choice of staff because of these intangibles really. So...so perhaps sometimes the writing team, people who are passionate about writing and developing curriculum haven’t always been the best people to...
As can be seen in the excerpt, coding involved summarising issues under thematic headings. Following coding, the issues identified under each heading were collated and descriptions, or statements, regarding each theme were produced. For example, all of the issues identified under the theme ‘organisational change’ were grouped and a statement about organisational change was produced. This process of coding and producing theme-based statements was completed for each case prior to analysis across cases. A process of cross-case analysis (Stake, 2006) was engaged in only after each case was analysed separately. Through cross-case analysis, generalised statements about each theme were produced. These were then compiled and used to address the research questions.
Supplementary research experiences

In addition to the theorising and field-based research phases of the study, some other activities supported the development of my overall understandings of the field of inquiry. These activities included participating in Smart Green Schools project meetings, attending conferences and seminars, and numerous site visits to schools across Australia, the United States of America and Europe.

Participation in Smart Green Schools project meetings (held quarterly for three years) provided an opportunity for me to learn about the relationships between learning and space. At these meetings presentations were made and discussed by the projects' academics, PhD candidates and industry partners, including architects, interior designers and sustainable building experts.

My attendance at conferences and seminars exposed me to contemporary thinking and action concerning middle years' education and the design of schools. During my candidacy I attended conferences and seminars in Melbourne, Hobart, Darwin, Perth, Chicago, London and Barcelona. A list of these events can be found in Appendix 3.

Visits to schools provided contextualised background information regarding past and present trends in school design and pedagogical approaches. These visits often included informal discussions with school leaders, teachers, architects and government officials. These discussions stimulated my thinking about the field-based research phase of the study.

Suitability of research methodologies and methods

Investigating and understanding processes of change was a key objective of the study. Therefore, a perspective informed by critical social theory was considered suitable as this approach aided recognition and interpretation of the actions of the social actors in the case study schools.

When the study commenced, a qualitative approach was considered essential for researching the relationships between innovative learning environments, pedagogies and student engagement. At the conclusion of the project, this approach appeared to have indeed supported in depth investigation of the research questions. The case study methodology bounded the field-based research and enabled both ethnographic and PAR methodologies to be employed. These methodologies and the data collection methods that were used supported the development of a
‘thick description’ of the social settings under investigation. A thick description was described by Bryman (2004, p. 544) as a “detailed account of a social setting that can form the basis for the creation of general statements about a culture and its significance in people’s social lives”.

Citing Lincoln and Guba (1985) and Guba and Lincoln (1994), Bryman (2004) proposed two primary criteria for assessing the quality of qualitative research: ‘trustworthiness’ and ‘authenticity’. Bryman also identified four further criteria within the concept of trustworthiness that may be used to evaluate qualitative research: ‘credibility’, ‘transferability’, ‘dependability’ and ‘confirmability’. Below, I apply these criteria to discuss the suitability of the design of the study for answering the research questions.

The trustworthiness (Bryman, 2004; Mattsson & Kemmis, 2007) of the study was supported by research strategies including, the conduct of longitudinal fieldwork, the making of regular observations, the checking of findings with social actors/participants/co-researchers (to ensure credibility), and the testing of insights through interactions with other professionals (to ensure dependability) (Gay, Mills & Airasian, 2006). The testing of insights was supported by discussion with my academic supervisors and supervision panel members throughout the research process. To the extent it is possible, I was also careful to ensure that my personal values did not sway the research findings (to ensure confirmability).

The production of a thick description (Bryman, 2004) supported the potential transferability of the project’s findings. Regarding the transferability of findings, Haggis (2008) suggested that although qualitative case study researchers are often careful not to claim their findings are readily transferable, it is possible to make connections between the results of a case study and other situations. Further to this, Bryman (2004) recommended that a thick description, based on qualitative methods, can enable others to make judgments regarding the possible transferability of findings to other settings or contexts. The ontological and epistemological perspectives that informed the study both imply that readers must use their own judgment when applying the findings from the study to other settings or contexts.

Cohen, Manion and Morrison (2007) suggested that through the triangulation of multiple methods, researchers may become more confident in their research findings, as each method may be compared against the others to ensure their validity (trustworthiness). Furthermore, Gay, Mills and Airasian (2006, p. 405) suggested that:

The strength of qualitative research lies in collecting information in many ways ... often two or more methods can be used in such a way that the weakness of one is compensated by the strength of another. For example, interviews with
students may be used to contribute to our understanding of what we observed happening in a lesson.

The triangulation of the data collection methods used in this study provided confidence in the project’s findings. Triangulation was achieved in a number of ways. Firstly, the use of multiple qualitative methods enabled the data and findings to be compared and cross-checked. Secondly, the longitudinal design of the study supported ‘time triangulation’, which Cohen, Manion, and Morrison (2007, p. 142) suggested takes into account “the factors of change and process”. Thirdly, ‘space triangulation’ was achieved through the collection of data from three case study sites. Cohen, Manion, and Morrison (2007, p. 142), recommend space triangulation as a technique useful for “overcom[ing] the limitations of studies conducted within one culture or subculture”.

The authenticity (Bryman, 2004) of the research methods was thought to be high. In keeping with what would be expected from a study informed by critical social theory and a PAR methodology, the research methods allowed participants to become involved with the research and engage in the project as both participants and co-researchers. Such involvement enabled them to gain a better understanding of their situation (ontological authenticity), gain a better appreciation of the perspectives of others (educative authenticity), become motivated to change their social settings (catalytic authenticity), and become empowered to engage in actions that transformed their social settings (tactical authenticity). In addition, I endeavoured to represent the different viewpoints of the participants/co-researchers without favouritism or prejudice towards any particular groups or individuals (fairness) (Bryman, 2004).

Building on the idea of authenticity, Mattsson and Kemmis (2007) proposed that the quality of praxis-related research should be assessed not only on the outcomes of the academic inquiry but based on the pragmatic outcomes of the research. That is, they suggested that the research should be judged in part by the changes that occurred in the social settings under investigation. Citing Kvale (1997), Mattsson and Kemmis (2007, p.208) proposed that:

… actions speaks louder than words … What counts as new knowledge may be important, but even more important is whether the knowledge is sufficient to produce a change in praxis.

Further to this, Mattsson and Kemmis (2007, p.207) concluded that:

The actions and patterns of action which follow as a result of new knowledge give evidence of the validity of new knowledge. If praxis is action informed by reflection, then changes in action that flow from new knowledge suggest that participants have themselves been changed by that knowledge, and that they regard it as compelling for them.
The actions of the school leaders, teachers and students who participated in the study are presented in Chapters 5-7. I suggest that the authenticity of the study's findings is reflected in their actions.

**Limitations of the study associated with its design**

Some potential limitations of the study’s methodology and methods were identified. These included: the difficulty involved in replicating the research due to its unique social settings and temporal elements; and potential problems associated with the transferability of findings to other settings or contexts, which may restrict the scope of the findings to the sampled populations. These potential limitations are believed to have been outweighed by the strengths of the research approach.

**Conclusion**

The objective of this chapter was to provide transparency (Mattsson & Kemmis, 2007) regarding how the research was carried out and on what grounds the findings from the research are claimed. Haggis (2008) concluded that research of any kind is located within particular epistemological and ontological assumptions. The material presented in this chapter was intended to (a) provide insight into the theoretical perspectives that informed the study’s design, (b) provide a clear description of the study’s methodology and methods, and (c) provide a framework with which to judge the quality (trustworthiness and authenticity) of the research findings. The following chapter (Chapter 4) provides further details regarding the conduct of the research at each case study site.
Chapter 4: The case study sites (schools)

Introduction

Maykut and Morehouse (1994) suggested that when reporting qualitative research the researcher should describe the people and/or settings that participated in the study. They also suggested that it is important for the researcher to provide an account of his/her ‘journey’ so that readers may “travel with [the researcher] to the discussion of the research outcomes” (p. 155). Informed by Maykut and Morehouse’s recommendations, the purpose of this chapter is to provide details of the physical environments and socio-cultural settings that were encountered at each of the case study sites and to briefly describe the research process at each site. I include this information to reveal the trustworthiness of the research (Maykut & Morehouse, 1994; Bryman, 2004; Mattsson & Kemmis, 2007) and to assist the reader to determine the relative transferability (Bryman, 2004) of the study’s findings to other contexts and/or settings. As discussed in Chapter 3, the case study schools were considered to be different sites within a single case study. This multiple case study approach (Bryman, 2004) was adopted to enable a number of sites to be used as interpretive contexts for investigating the research questions.

The selection of the case study sites was made using a process of convenience sampling (see Chapter 3). Due to the interests of the research project’s funding partners, the three schools that were selected were all state funded public schools. These schools were all located in metropolitan Melbourne, yet they differed in a number of ways: one was a primary school, the other two were secondary schools; the schools catered for significantly different numbers of students; the communities served by the schools were stratified by socioeconomic status; the schools were geographically distributed across the metropolitan area (each school was situated within a different Department of Education and Early Childhood Development (DEECD) regional office zone); and the designs of the innovative learning environments varied between schools.

For each case study site, the following information is provided below: an overview of school, details of recent infrastructure changes, a description of the learning settings/environments that were studied, and an outline of the research process. Each school was given a pseudonym to protect its identity and each individual who took part in the study was also given a pseudonym in keeping with the ethics agreement that was entered into with the research participants.

As an introduction to later discussion of the research process at each case study site, I provide the following table (see Table 4). This outlines the dates of the significant data collection events.
that occurred throughout the course of the study. The principal reason(s) for each site/school visit are indicated.

Table 4. Snapshot of fieldwork/data collection activity.

<table>
<thead>
<tr>
<th>School A</th>
<th>School B</th>
<th>School C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008</strong></td>
<td><strong>2008</strong></td>
<td><strong>2008</strong></td>
</tr>
<tr>
<td>Sept 2 - Observation</td>
<td>Sept 8 – Parent information session</td>
<td>Oct 29 – Meeting with school leaders</td>
</tr>
<tr>
<td>Sept 10 - Meeting with school leaders</td>
<td>Nov 11 – Meeting with school leaders</td>
<td>Dec 1 – Forum/workshop to review current setting in the Hub</td>
</tr>
<tr>
<td>Nov 7 - Interviews with school leaders and teachers</td>
<td>Nov 26 – Staff professional development day</td>
<td></td>
</tr>
<tr>
<td>Dec 5 - Interviews with school leaders and teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec 11 - Observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2009</strong></td>
<td><strong>2009</strong></td>
<td><strong>2009</strong></td>
</tr>
<tr>
<td>Jan 29 - Meeting with school leaders</td>
<td>27 Jan – Meeting with school leaders and observation</td>
<td>Feb 11- Meeting with school leaders</td>
</tr>
<tr>
<td>Feb 10 - Meeting with all Year 7 and 8 teachers and planning session with select Year 7 and 8 teachers</td>
<td>Feb 11 – Design session with students and observation</td>
<td>Feb 26 – Interviews with school leaders and observation</td>
</tr>
<tr>
<td>Feb 24 - Planning session with select Year 7 and 8 teachers</td>
<td>Feb 20 – Interview with Principal</td>
<td>Mar 12 – Observation</td>
</tr>
<tr>
<td>May 8 - Observation</td>
<td>May 11 – Meeting to discuss furniture selection and observation</td>
<td>April 30 – Observation</td>
</tr>
<tr>
<td>May 21 - Observation</td>
<td>May 15 - Meeting to discuss furniture selection</td>
<td>May 14 - Review forum with teachers</td>
</tr>
<tr>
<td>June 4 - Observation</td>
<td>June 9 – Observation and informal discussion with teachers</td>
<td>May 28 – Observation and review forum with teachers</td>
</tr>
<tr>
<td>June 18 - Observation</td>
<td>July 6 – Informal discussion with teachers</td>
<td>July 30 - Meeting with school leaders</td>
</tr>
<tr>
<td>July 21-22 - Curriculum review and development team meeting</td>
<td>Aug 7 – Observation and informal discussion with teachers</td>
<td>July 31 - Meeting with students</td>
</tr>
<tr>
<td>Aug 7 – Forum with teachers and observation</td>
<td>Aug 13 – Observation and informal discussion with teachers</td>
<td>Aug 10 - Observation</td>
</tr>
<tr>
<td>Aug 13 – Forum with teachers and meeting with school leaders</td>
<td>Aug 27 – Interviews with teachers</td>
<td>Aug 20 – Visioning and design workshop</td>
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<tr>
<td>Sept 16– Interviews with school leaders and teachers</td>
<td>Aug 16 – Observation and informal discussion with teachers</td>
<td>Nov 6 – Interviews with students</td>
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<td>Oct 29 – Interviews with teachers students</td>
<td>Nov 10 – Learning spaces multimedia activity with students</td>
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<tr>
<td>Nov 12 – Interviews with students</td>
<td>Nov 17 – Review forum with teachers and interviews with students</td>
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<tr>
<td><strong>2010</strong></td>
<td><strong>2010</strong></td>
<td><strong>2010</strong></td>
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<tr>
<td>Jan 28 – Review forum with school leader, teachers etc.</td>
<td>Jan 28 – Review forum with school leaders</td>
<td>May 2 – Inspection of Hub refurbishment</td>
</tr>
<tr>
<td>Feb 11 – Review forum school leaders and teachers</td>
<td>May 28 – Observation and review forum with teachers</td>
<td>Sept 15 – Review forum with teachers</td>
</tr>
</tbody>
</table>
Descriptions of the case study sites (schools)

School A – Suburban High School (Suburban HS)

Figure 20. Suburban HS: SWiS buildings.

School overview: recent changes and current demographics

Suburban High School (Suburban HS) is a co-educational school that caters for students in Years 7 to 12. The school, located in an outer suburb of Melbourne, had undergone significant organisational, educational and physical changes over six years, up to the present time. In 2004, three existing local schools began talks regarding how they could improve the educational outcomes for their students. These talks were initiated because of the poor condition of each school’s facilities and falling enrolments. This ultimately led to the merger of the three schools into one large school of more than 2000 students and 250 teachers and auxiliary staff in 2009 (citation withheld). The formation of the new school was expected to improve the overall experience of school for students and create better pathways for them to tertiary education and the workplace.

During the period of this study, many of the students at Suburban HS were from disadvantaged socio-economic backgrounds and a high proportion of the school’s families were recent immigrants to Australia. Because of this significant immigrant population, the school was highly multicultural, with more than 70 languages spoken by the students who attended (citation...
An extensive English as a Second Language (ESL) program operated to support the education of these students.

**Recent infrastructure changes**

The merger of the three pre-existing schools in 2009 coincided with a $45 million building program funded through the Victorian Government’s Leading School Fund (citation withheld). This program involved the sale of one school site and the construction of new facilities and the refurbishment of some existing facilities on the remaining two sites. Conveniently, the sites that were retained were located on either side of the same street. Prior to this building program, the students who attended the pre-existing schools were mostly educated within the context of a traditional educational paradigm. This was characterised by the accommodation of students and teachers in traditional classrooms, with four walls and desks in rows, and a textbook-driven curriculum. The facilities at these schools were described by the Suburban HS Principal as "very run down" (7/11/08). He believed the design and poor condition of these facilities had a negative influence on students’ learning.

The following three figures (Figures 21, 22 and 23) depict recent infrastructure changes at Suburban HS. As can be seen by comparing Figure 21 and Figure 22, these changes included the demolition of a number of buildings across both of the retained sites, the construction of a number of new buildings on the southern site and the development of sporting facilities on the northern site. The buildings of particular interest to this study were the ‘triangular’ School Within School (SWiS) buildings that were constructed on the southern site. Each of these seven buildings was expected to cater for 300 students in Years 7-12. Due to the school’s organisational structures, students were to attend one of these SWiS buildings for the majority of each school day. They were only expected to leave to attend classes that required specialised facilities. During the period of my field work, only three SWiS ‘houses’ had been constructed and were occupied by students and teachers. The other four were under construction.
Figure 21. Suburban HS: aerial photograph of site prior to building program.

Figure 22. Suburban HS: site plan showing the location of existing facilities to be retained and new facilities to be constructed.
Specific learning settings/environments studied

Fieldwork at Suburban HS was conducted mainly within one SWiS building. The focus of this research was on the educational settings found on the first floor, where the Year 7 and Year 8 students were accommodated. The following figures (see Figures 24-35 below) depict the learning environments that were found in and around this building.

Figure 24. Suburban HS: SWiS building external views.
Figure 25. Suburban HS: SWiS building ground floor.

Figure 26. Suburban HS: SWiS building first floor.
Figure 27. Suburban HS: SWiS building first floor common area.

Figure 28. Suburban HS: SWiS building first floor targeted teaching area.

Figure 29. Suburban HS: SWiS building first floor common area (reverse view).
Figure 30. Suburban HS: SWiS building first floor platform area.

Figure 31. Suburban HS: SWiS building first floor studio lab.

Figure 32. Suburban HS: SWiS building first floor relaxing and reading area.

Figure 33. Suburban HS: SWiS building first floor large group teaching space (south).

Figure 34. Suburban HS: SWiS building first floor large group teaching space (north).

Figure 35. Suburban HS: SWiS building staff study.
Research process

My fieldwork at Suburban HS began with a visit to the site in September 2008. This initial visit involved observing 50 Year 7 students and three teachers in a prototype learning environment that had been created to support small teams of teachers (2-3) to develop and refine new pedagogies and spatial usage schemas with their classes. This prototype space was set up in a double portable classroom with the assistance of the interior designer who worked on the SWiS buildings. The team leading the spatio-pedagogical project at the school hoped that new pedagogical and spatial practices could be developed in this space and that these practices would inform pedagogies and the use of space in the new SWiS buildings. Figure 36 (below) shows the furniture fit-out and intended learning settings in this temporary facility.

Figure 36. Suburban HS: Year 7 prototype learning facility floor plan, with intended learning settings/zones indicated.
Before the end of the 2008 school year, I observed the prototype learning environment a second time. Also during this time I began interviewing the school leaders and teachers who were instrumental in orchestrating the physical, organisational, social, and cultural changes at the school. The first of these interviews was conducted with the school’s Principal and two Associate Principals. This interview showed the school leaders to be candid in their communications regarding the intricacies and difficulties associated with transforming the school physically and pedagogically.

In early 2009, I attended a series of staff meetings and professional development days. These events revealed the broad scale and scope of the transformation process that was being undertaken. It was evident that the process of merging the three schools was multifaceted and ambitious, and it quickly became apparent that this process involved not only significant physical change, but also the bringing together of distinct cultures of practice from each of the pre-existing schools.

Also in early 2009, I attended two staff planning sessions. My attendance at these sessions provided me with insight into the activities that the school leaders were asking teachers to perform to aid their transition into the new education model and learning environments in the SWiS buildings. Principally, the teachers were working towards collaborating as teams of three so they could team-teach cohorts of 50 students. At these sessions good relationships were established with a number of teachers. These relationships enabled me to conduct regular fieldwork throughout the following 12 months.

The SWiS building that was central to my fieldwork was first occupied in May 2009. During the period of May-August 2009 I made regular visits to this building to observe the Year 7 and Year 8 students and their teachers using these new learning spaces, often taking the opportunity to talk informally with both students and teachers (see Table 4 above for details).

My attendance at a two-day planning and development session in July 2009 augmented this fieldwork and the PAR process. At this session, the newly-combined school’s 30 member Curriculum Review and Development Team discussed the recent developments at the school and identified future directions for action. The relationships between the new learning environments and the education model being developed were discussed at length.

During the later months of 2009 I conducted interviews with school leaders, teachers and students to gain insight into their experiences of the new learning environments. In addition, I conducted focus group forums with selected school leaders and teachers as part of the
participatory action research (PAR) phase of the study, and talked informally with school leaders and teachers. Focus group forums were held to discuss the development of the new education model and how teachers and students might use the new learning environments to best support the new model/pedagogies.

In January 2010, I attended two final focus group forums. The first of these I requested be held to conclude the PAR phase of the study. This forum was attended by the school leaders (including the Principal, two Associate Principals, and the Assistant Principal who was in charge of the SWiS building in which much of the fieldwork was conducted), another member of Smart Green Schools team, six interested teachers, the school’s education consultant, and the two lead architects and the interior designer on the building project. At this session the early findings from this case study site, following my initial analysis of the observation, interview and focus group forum data, were presented and discussed. The second forum was initiated and conducted by the school to explore in greater depth some of the issues that had been raised at the previous forum. This session was attended by members of the schools’ teaching staff and me.

Although the physical and pedagogical transformation process at Suburban HS was ongoing, the scope of this research project was limited by time and resources. Fieldwork was concluded in February 2010.

The findings based on this fieldwork are presented and discussed in association with the findings from the other case study sites (schools) in Chapters 5-7.
School B – Inner City Primary School (Inner City PS)

Figure 37. Inner City PS: main entrance.

School overview: recent changes and current demographics

Inner City Primary School (Inner City PS) was established in 1873 in buildings dating from 1853, all of which are now heritage listed. The school is co-educational and caters for up to 275 students in Prep to Year 6. The school is located on a compact site in a privileged socio-economic area three kilometres from the central business district of Melbourne. Less than ten percent of students come from homes where a language other than English is spoken as a first language (citation withheld).

Between 2005 and 2007 the number of students attending the school dropped from a maximum capacity of 275 to 250 (citation withheld). In 2008 a new Principal and a new Assistant Principal were appointed to the school. They inherited a building renovation/refurbishment project in its early stages. The focus of this project was on updating the Year 5/6 learning area and the school library. Funding for the project was provided by the Victorian Government’s Building Futures Scheme (citation withheld). The new school leaders took on the project with enthusiasm and drove it from a philosophical position that embraced the educational concepts of constructivist learning and personalised learning. The Principal had an ambitious vision for the Year 5/6
learning community. He wished to create a more stimulating and challenging schooling experience for these students and viewed the building project as an opportunity to further his vision. He wished to shift from an education model that was defined by a social organisational structure/unit of 25 students and a single teacher, to a new education model that was based on three teachers working collaboratively with approximately 75 students.

**Recent infrastructure changes**

Because of the heritage listing of the schools’ buildings, the renovations carried out were required to be contained within the interiors of the existing buildings. The facades of the buildings were not to be altered, apart from receiving a fresh coat of paint. The initial budget for the project was approximately $500 000. This was later supplemented with an additional $60 000, to cover unexpected under floor works. Figure 38 (below) shows the site plan for the school. All building works were undertaken in the West Building.

**Figure 38. Inner City PS: site plan (following renovation in 2009).**

Renovation/refurbishment works were conducted in the West Building in the areas outlined on the figure shown below (see Figure 39). Apart from a desire to update the Year 5/6 area and the school library to facilitate new pedagogical opportunities, a driving force behind the project was the desire to improve the physical conditions in the Year 5/6 area. Students and their parents had complained for a number of years about the poor air quality and the smell of mould in this part of the school.
The structural work in the Year 5/6 area meant that three previously self-contained classrooms were interconnected to create a more open learning environment. In addition, these spaces were connected to the corridor to the south and the classroom to the west by large glass paneled sliding doors. The corridor, which historically had only been used for circulation, was developed as a learning space. Renovation work in the library saw the pre-existing library space connected with an adjacent room by integrating a portion of the corridor into these spaces.

Figure 39. Inner City PS: areas renovated in the West Building in 2009.
Figure 40. Inner City PS: Year 5/6 classroom just prior to building works.

Figure 41. Inner City PS: Year 5/6 classroom during building works (note under floor work).
Specific learning settings/environments studied

The majority of fieldwork undertaken at Inner City PS was conducted in the Year 5/6 area. Observational data was collected in the spaces depicted below (see Figures 42-52). The PAR component also focused on this area.

Figure 42. Inner City PS: Year 5/6 area following renovation/refurbishment in 2009.

Figure 43. Inner City PS: Year 5/6 instruction area 3 (foreground) and instruction area 2 (background)–post-refurbishment.
Figure 44. Inner City PS: Year 5/6 area axonometric views.

Images: Cathi Cola Architects.
Figure 45. Inner City PS: Year 5/6 corridor learning space – post-refurbishment.

Figure 46. Inner City PS: Year 5/6 glass panelled sliding doors (view to west classroom) – post-refurbishment.

Figure 47. Inner City PS: Year 5/6 instruction area 2 (platform) – post-refurbishment.

Figure 48. Inner City PS: Year 5/6 student lockers – post-refurbishment.
Research process

Following an initial meeting between the school Principal and the Smart Green Schools’ project team, I began fieldwork at the school in September 2008. My first visit to the school involved attending a parent information evening that was organised by the Principal to discuss the school’s proposed infrastructure and pedagogy changes. As he was amenable to an ongoing collaboration with the Smart Green Schools project, he requested that I make a presentation during this session to explain the project teams’ interests and program.

In November 2008, I attended a whole school staff professional development day, along with other members of the Smart Green Schools’ project team. The focus of the day was on the school’s values, vision and big-picture aims. Attendance at this session facilitated discussion with teachers and exposed their varied attitudes towards the proposed physical and pedagogical
changes at the school. In November 2008, I attended another meeting with the school Principal to discuss the educational objectives associated with the school’s building program.

During Term One 2009, the Year 5/6 students and their teachers were accommodated in the school library while renovation work was carried out on their learning spaces. By default, the occupation of the library acted as a spatial and pedagogical trial. The information gleaned from setting up and using this space informed later decisions about the development of new pedagogies and the selection of furniture for the Year 5/6 learning environment.

In February 2009, I interviewed the school Principal to gain a more thorough understanding of his evolving vision for the Year 5/6 area. At this time I also initiated the PAR phase of the research at this site. The PAR process began with the school’s 69 Year 5/6 students participating in a design activity that was organised by their three teachers and me. During this session, the students drew pictures and plans to depict the various types of furniture they wished to see purchased for their new spaces. The ideas that they generated subsequently informed further activities related to furniture selection. As part of a maths unit on measurement, for example, a group of 20 students measured the newly renovated Year 5/6 area, drew plans to scale, and inserted their own furniture layouts (a selection of these can be seen in Chapter 5).

During May 2009, I attended a number of PAR related meetings with people including the Principal, Assistant Principal, teachers, students, parents, and members of the school council. At these meetings we discussed how the structurally renovated/refurbished spaces should be furnished and what pedagogies should be employed. At one of these meetings, a group that included the Principal, the head of the school council, three students and three parents (with backgrounds in architecture and interior design) critiqued furniture proposals from five furniture suppliers. All of these proposals were deemed unacceptable, as they were all based on traditional ideas about how schools should function pedagogically and should be furnished.

At a subsequent meeting, a general furniture layout for the spaces was devised by a group that included a Year 5/6 teacher, eight Year 5/6 students, the Chief Investigator of the *Smart Green Schools* project and me. Working collaboratively, this group reviewed earlier discussions about how the spaces should be used and what types of furniture should be purchased. Following this meeting, a parent-architect drew the proposed furniture layout to scale (see Figure 42 above) to ensure it was appropriate. The final selection of furniture was made by the Principal and the school council. During this time the idea of including a platform in the central open zone was floated. This was ultimately built during Term Three.
Throughout the furniture selection process I held regular informal discussions with the Principal and the three Year 5/6 teachers. During these discussions we explored how the new spaces might work pedagogically. These discussions led to the subsequent phase of the PAR process that focused on developing new pedagogical practices. To pursue this aspect of the PAR, I held regular informal meetings with the Year 5/6 teachers and the Principal. In particular, we discussed how emergent pedagogies were being aided or inhibited by the new spaces. During these visits I also observed the students and teachers in their new learning environment.

The formal interviews with teachers and students were conducted between August and December 2009, after the new spaces had been occupied for between three and six months. The interviews I conducted with the students were supported by short multimedia documentaries that I had asked them to create. As outlined in Chapter 3, these presentations included photographs of students using their preferred and non-preferred learning spaces and a commentary regarding their experiences and perceptions of the spaces. Prior to each student interview, I viewed their documentary and subsequently used it as a prompt during the semi-structured interview.

In November 2009 a focus group forum was held with the three Year 5/6 teachers to review the initial research findings from the site (school). Fieldwork at Inner City PS was concluded in December 2009.

The findings based on this fieldwork are presented and discussed in association with the findings from the other case study sites (schools) in Chapters 5-7.
School C – Seaside Secondary College (Seaside SC)

Figure 53. Seaside SC: external view of the middle years’ campus.

School overview: recent changes and current demographics

Seaside Secondary College (Seaside SC) is a co-educational school with a student population of more than 1400 in Years 7-12. The school is located in a bay-side suburb of Melbourne with a high socio-economic status. The popularity of the school is such that the number of students entering Year 7 has been capped at 250. The majority of students entering Year 7 come from local primary schools; however, some students travel from more distant suburbs to attend. The school was established in 1915 on a site which is now occupied by the senior school (Years 10-12).

The middle years’ campus (Year 7-9) was the focus for the research at this school. Significant changes were instigated at the campus in 2000, when Seaside SC merged with another school which had previously occupied the site. The merger of the two schools coincided with a $13 million building program that brought about the demolition of all of the existing buildings on the campus and the construction of new buildings. These buildings were first occupied in 2007 (citation withheld).
The school leaders at the middle years’ campus had a strong interest in developing environmental education programs and incorporating sustainable living practices into the day-to-day life of the school. These interests informed the design of the campus’ new facilities.

Figure 54. Seaside SC: middle years’ campus master-plan.

Recent infrastructure changes

The new buildings at the middle years’ campus were constructed within the constraints of a limited budget, yet were designed to incorporate leading sustainable design principles. All of the buildings featured a northerly orientation, natural ventilation (there is no air-conditioning), good natural lighting, low energy electric lighting, energy efficient gas heating and solar heated hot water. Work on these new facilities began in 2005 and ended in 2008, when landscaping works were completed. In 2009, a sizeable wetland area was constructed between the campus and the marine sanctuary situated directly in front of the school. The layout of the buildings can be seen in the plan shown below (see Figure 55).
Figure 55. Seaside SC: middle years’ campus buildings plan.
Specific learning settings studied

The new buildings at the middle years’ campus mostly comprised traditional self-contained classrooms - including three double classrooms fitted with operable walls – with the exception of a large space, known as the ‘Hub’, which was the focus for the fieldwork conducted at this case study site. This space, located on the first floor of Building B (see Figure 55 above), was equivalent in size to four traditional classrooms; including what would be a central corridor. Figures 56-61 (below) show the Hub in 2008 when fieldwork began. Figures 62-73 (also below) depict the same space in 2010, post-refurbishment.

Although the fieldwork undertaken at Seaside SC was mostly conducted in The Hub, I frequently followed classes that had been timetabled to this space to other learning environments, including general classrooms, computer labs and the library to further my observations.

Figure 56. Seaside SC: The Hub in use – pre-refurbishment.
Figure 57. Seaside SC: The Hub central area – pre-refurbishment.

Figure 58. Seaside SC: The Hub north side – pre-refurbishment.

Figure 59. Seaside SC: The Hub north east area – pre-refurbishment.

Figure 60. Seaside SC: The Hub south east area – pre-refurbishment.

Figure 61. Seaside SC: The Hub south west area – pre-refurbishment.
Figure 62. Seaside SC - The Hub refurbishment floor plan (Building B – First Floor).
Figure 63. Seaside SC: The Hub refurbishment presentation area concept (artist’s image).

Figure 64. Seaside SC: The Hub refurbishment wet area concept (artist’s image).

Figure 65. Seaside SC: The Hub refurbishment lounge and e-collaboration area concept (artist’s image).

Figure 66. Seaside SC: The Hub presentation area – post-refurbishment.

Figure 67. Seaside SC: The Hub fixed platform and moveable boxes – post-refurbishment.
Figure 68. Seaside SC: The Hub e-collaboration area – post-refurbishment.

Figure 69. Seaside SC: The Hub view through the tutorial area – post-refurbishment.

Figure 70. Seaside SC: The Hub tutorial area – post-refurbishment.

Figure 71. Seaside SC: The Hub wet area – post-refurbishment.

Figure 72. Seaside SC: The Hub research and discussion area – post-refurbishment.

Figure 73. Seaside SC: The Hub laptop trolleys – post-refurbishment.
Research process

Fieldwork at Seaside SC began in October 2008 when members of the *Smart Green Schools* team met with the Campus Principal, Campus Assistant Principal, and Leading Teacher Margaret, the teacher in charge of the Year 7-9 inquiry-based learning program. This meeting included a tour of the Hub and discussion about the difficulties that teachers’ and students’ encountered in this space during the first 18 months of occupation. It was revealed that the school wished to refurbish the space to make it more conducive to the school’s inquiry-based learning program.

Following this initial meeting, the PAR phase of the study was initiated with a half-day workshop in December 2008. The purpose of the workshop was to evaluate the effectiveness of the Hub as a learning environment. It was attended by seven Seaside SC staff members and eight *Smart Green Schools* team members (including both academic researchers and project partners), an acoustics engineer, and the architect who had designed the campus’ buildings. The workshop began with presentations from the Campus Principal, the research team, and the acoustics engineer. This was followed by a discussion about the strengths, weaknesses, opportunities, and threats associated with the space. At the conclusion of the workshop, the Campus Principal made it clear that he was keen to see the learning environment in the Hub improved to better meet the needs of both students and teachers. He indicated that although he was unsure when finance might be available to carry out any building works, the school would like to collaborate with the *Smart Green Schools* research team to redesign the Hub.

In February 2009, I met with the Campus Principal and Margaret to discuss a research process that would serve the needs of both the school and the research project. Following agreement on the process, I began observation of students and teachers using the Hub. I also formally interviewed the Campus Principal and Margaret at this time.

Each month between February and June 2009 I observed two groups of students and their teachers using The Hub. These cohorts were a Year 7 group of 75 students (taught by 3 teachers) and a Year 8 group of 50 students (taught by 2 teachers). During July and August 2009 I observed another cohort of 50 Year 8 students (taught by 2 teachers). During each visit to the school, I also held informal discussions with teachers. These discussions focused on how the Hub space may have influenced teaching and learning activities.

In early May 2009, a focus group forum was held with the teachers I had observed working in the Hub up to that point in time. This forum was conducted to review some early findings that had emerged from the December 2008 workshop, formal interviews, informal discussions, and my observations. The feedback that was received from the teachers during this forum provided direction for the subsequent PAR process.
At another forum held in late May, the issues discussed earlier in the month were elaborated on and the spatial design implications associated with these issues were discussed.

In August 2009, a full-day educational visioning and spatial design workshop was conducted with nine Seaside SC staff members (including the School Principal and Campus Principal) and seven members of the Smart Green Schools team. The Smart Green Schools team included academic researchers with backgrounds in architecture, education, sustainable design and educational planning, along with project partner architects and interior designers. The morning session was devoted to defining and articulating a shared vision for learning in the Hub, while the afternoon session focussed on creating design concepts for the Hub that could support that educational vision.

Towards the end of 2009, the school appointed the architectural firm that had designed the campus’ buildings to draw up new plans for refurbishing the Hub. These plans were informed by the outcomes of the August 2009 workshop.

Refurbishment work was carried out in the Hub between February and April 2010, and the space was again occupied late in May 2010. In September 2010, a final focus group forum was held with eight teachers to investigate how the new spatial arrangements in the Hub had influenced teaching and learning.

The findings based on this fieldwork are presented and discussed in association with the findings from the other case study sites (schools) in Chapters 5-7.

**Conclusion**

In this chapter I introduced and described the case study sites (schools) and briefly outlined how the research proceeded at each site. As can be inferred when reading this chapter, the research took a slightly different direction at each site due to the varied situations and interests of the participating school communities. Nevertheless, the methodology and methods that I described in Chapter 3 were common across these settings.

As would be expected from a project informed by a participatory action research methodology, the research across the three sites was highly collaborative. Collaboration with participant co-researchers from the case study schools and the Smart Green Schools project team was instrumental in gaining insight into the issues surrounding the design and use of innovative middle years' learning environments.
Investigating the research questions using a multiple case study approach (Bryman, 2004) enabled a diversity of experience to be incorporated into the overall case study. This strengthened the trustworthiness of the project's findings. These findings are presented and discuss in Chapters 5-7. Rather than present and discuss the findings from each case study site separately, I have aggregated the findings under the umbrella of the overall case study. Organising the report in this way enabled me to discuss the themes that emerged from across the multiple sites/settings (Maykut & Morehouse, 1994).
Chapter 5: Creating innovative middle years learning environments: why, how and what?

Introduction

Figure 74. The study’s field of inquiry. Chapter focus: the influence of pedagogies on the design of physical learning environments.

The findings and discussion of findings in this study have been separated into three chapters. In this first of the findings and discussion chapters, the following subsidiary research question is addressed: How are contemporary constructivist middle years pedagogies influencing the design of learning environments?

Following a short introduction to the theoretical framework that informed my analysis of the field data and supported my discussion of the findings, this chapter is divided into three main sections: ‘drivers for change’, ‘design process’ and ‘architectural responses’. These section headings were based on my analysis of the field-data: Respectively, they address ‘why’ the case study school communities planned to create innovative learning environments, ‘how’ they went about creating these environments, and ‘what’ characterised the learning environments they created.

The findings that are presented below are aggregated from across the case study sites. These findings are augmented with quotes extracted from interviews to provide evidence in support of the claims that are
made and to ensure that the voices of the projects’ co-researchers/ participants were heard. In addition, specific sites are referred to in order to illustrate particular phenomenon.

The schools that took part in this study were selected due to their involvement in spatio-pedagogical projects that dealt with the development of innovative learning environments and contemporary pedagogies. The individuals who drove these projects were the school leaders – principals, associate principals, assistant principals and leading teachers. The findings that are presented and discussed in this chapter were mostly derived from a series of interviews with these influential people. To a lesser extent, the perspectives of the teachers and students who took part in these projects are also represented. Although their voices may not be prominent in this chapter, they are conveyed strongly in subsequent chapters.

School communities do not act in isolation to imagine and deliver new socio-spatial contexts for learning. Architects, interior designers, landscape architects, education consultants, members of school council and parents are all instrumental in driving these projects forward. I chose to focus on the perspectives and opinions of school leaders, teachers and students because I wished to portray the voices of those who stood to be directly affected by changes to learning environments and pedagogies. Because of the constraints of time and resources, I have not directly reported the voices of others who participated; although discourse with them informed my understandings of the events that occurred in the case study schools.

In the following section, I outline the theoretical framework that informed my analysis of the field-data and supported discussion in this chapter. This outline includes a discussion of critical pedagogy (Freire, 1970; 1973; Giroux 1985; Apple, 1995) McLaren, 1998; 2007; Giroux & Schmidt, 2004). I use this conceptual tool to analyse and discuss the motivations, objectives and intentions of the school leaders and to explore the ideological, sociological, pedagogical and spatial implications of their educational aspirations.

Theoretical framework for analysis and discussion

Critical pedagogy

In common with other constructivist theories of learning, a critical pedagogy approach to education promotes learning that is situated in the lived experience of learners. Exponents of critical pedagogy, including Freire (1970; 1973), Giroux (1985; Giroux & Schmidt, 2004), Apple (1995), and McLaren (1998; 2007), advocated the co-construction of learning and the application of reflective practices, so that
students may become empowered to understand their situation and take informed action to improve their lives and the lives of others. To this end, critical pedagogy is about preparing students as life-long learners and about social justice. Horne (2004, p. 6) concluded:

Schools should strive not just to create knowledgeable young people but people who know how to use and apply their knowledge in a way that is meaningful and valuable to them beyond the formal setting of the examination hall.

The origins of critical pedagogy have been attributed to the works of educational luminaries Paolo Friere and John Dewey (Leonardo, 2004). Subsequently, educators operating in a critical pedagogy paradigm have attempted to break down disciplines and create interdisciplinary knowledge. They have been aware of power relationships that are shaped by race, gender, class and ethnicity, and have questioned cultural and political systems by asking who benefits from such structures.

A critical pedagogy approach to education is intended to support emancipatory actions that promote the development of democratic learning situations – situations that are characterised by their social cultures. Thus, critical pedagogy is expected to support connectedness between the lived experiences of students and teachers and their institutionalized education by encouraging active engagement with the cultural resources that they bring with them to school and critical reflection on such knowledge for purposes of creating a sense of identity and community. Critical pedagogues value the development of multiple literacies, so that students may engage with the world through many modes and become agents of positive change within their communities. In addition, critical pedagogy is intended to provide a holistic perspective from which to engage in whole school change. Ultimately, critical pedagogy focuses on the democratization of schooling institutions with a view to subsequently supporting the democratization of society. To this end, Fisher (2002, p. 76) concluded:

Most importantly, critical pedagogy embraces teaching for social justice and emancipation, focusing on 'whole school change'. It also confirms that knowledge is socially constructed, that reading is beyond both the text and the curriculum and that students can engage in a meaningful authentic process of learning directed towards social action.

McLaren (1998, p. 454) took these ideas one step further by calling for a critical pedagogy that moved in “the direction of challenging new carceral systems of social control through the development of a critical pedagogy of space”. Fisher (2002) believed that critical pedagogy was still predominantly separated from the design of school buildings. He concluded that only recently have critical pedagogy theorists explored spatio-pedagogical power in the contexts of schools, engaged in a deeper spatial analysis of schools, and considered pedagogy and social control measures within a critical pedagogy of space. He also suggested that critical pedagogy needed to “struggle with the implications of weaving the silent and unconscious acceptance of spatiality into these ideas” (Fisher, 2002, p. 81).
Links between critical pedagogy, space, power, and student engagement have also been identified by tertiary educator bell hooks (sic) (1994, p. 158), who wrote:

‘Engaged’ is a great way to talk about liberatory classroom practice. It invites us always to be in the present, to remember that the classroom is never the same. Traditional ways of thinking about the classroom stress the opposite paradigm – that the classroom is always the same even when the students are different … To me the engaged classroom is always changing. Yet this notion of engagement threatens the institutionalized practices of domination. When the classroom is truly engaged, it’s dynamic. It’s fluid. It’s always changing.

*The use of critical pedagogy in this chapter*

In this chapter, I use the lens of critical pedagogy to examine the motivations, objectives and intentions of those who directed the spatio-pedagogical projects in the case study schools – the school leaders. I examine their educational rationales for change, their educational visions for the future, and the expectations they held about the influences that innovative learning environments may have on middle years’ socio-spatial contexts and socio-pedagogical cultures.

*Drivers for change*

In this section I discuss why the case study schools wished to create innovative learning environments and interrogate the educational thinking that informed the school leaders’ decisions regarding the production of new socio-spatial contexts for learning.

*Educational rationales*

*Motivations for change*

Across the case study schools, the creation of new learning environments was primarily driven by a desire to improve the overall experience of school for middle years students. This desire was accompanied by a wish to improve the physical and social nature of teachers’ workplaces – including those socio-spatial contexts dedicated to teacher study, collaboration and socialising, and those shared with students.

A number of issues underpinned the school leaders’ desires to improve the overall experience of school for their students and teachers. Apart from wishing to replace or refurbish physically run-down facilities,
the most prominent motivation for change was the belief that the ‘cells and bells’ model of education was holding back pedagogical innovation. Overwhelmingly, school leaders agreed that pedagogical progress had been stifled by the organisational structures that had been embodied in traditional school architecture characterised by cellular classrooms. Among school leaders, there was a consensus that the learning experiences afforded by traditional classrooms did not align with their desired educational practices.

Timothy, the Principal at Suburban HS, summarized his perspective:

The driver for the school has been living and working in what we considered to be a run-down physical environment and a very dated teaching and learning environment. They are just boxes. We are noticing that engagement of kids is slowly slipping. Results in the school are okay, but there is more than that about the learning experience for the kids (7/11/08).

School leaders cited a number of limitations associated with the pedagogical opportunities afforded by the traditional classroom model. These included: a lack of opportunity for learning to occur across a range of modalities – often exacerbated by the disproportionate amount of space taken up by teachers’ desks and resources; a lack of opportunity for students to direct their own learning; a lack of ownership of the learning environment by students and teachers; and concern about variation in the educational programs and the standard of teaching between classrooms.

Furthermore, school leaders believed that the ‘cells and bells’ model was leading to poor student engagement. Specifically, they thought that instructivist teaching practices were not engaging students because such pedagogies did not enable them to set individual goals or pursue learning that was of interest to them. Based on negative feedback received from students, school leaders realised that many middle years’ students were not being academically or socially challenged or adequately supported by their schooling experience. In response, they initiated spatio-pedagogical projects to substantially alter the spatial and pedagogical landscapes in their schools. Craig (26/8/09), a teacher at Inner City PS, outlined his perspective on why changes were instigated at his school: “they [the school leaders] were getting feedback that the students were bored and not extended and this is why this was put in place”.

Engagement was thought to be associated with genuine curiosity and a desire to learn. When asked what student engagement meant, Jennifer, an associate principal at Suburban HS, suggested that engagement was about “taking real responsibility for your own learning … having individual goals and taking individual responsibility” (5/12/08). Asked how this could be facilitated, she suggested that a less teacher-directed approach to learning was important. She elaborated:

I don't see how you can have the full engagement concept and still a transmission methodology … And excitement is the other part of it. There is a genuine curiosity and desire to learn. When I look at what was going on here, I think that the middle years was really about producing that and I don't think
teachers understood what it was about. They thought it was about having a few activities that might have been fun so that kids would want to come to school. That's okay, but it is pretty limited (5/12/08).

Educational objectives

The school leaders observed in this study strove to develop new socio-spatial contexts for learning because they wanted to personalise learning for each student, create socially connected learning communities, change teacher practice to encourage contemporary middle years pedagogies, and create a schooling experience for students that was engaging, meaningful and of value to them in today's globalised society.

The actions undertaken to pursue these objectives differed between schools, however, clear similarities between their approaches were evident. In order to personalise learning for each student, the school leaders believed that new socio-pedagogical cultures that encouraged students to take on more responsibility for their own learning were required. They recognised that if students were to pursue learning because it mattered to them, they needed to ensure that learning was “not just fun” (Jennifer, 5/12/09), but of intrinsic value to them.

When commenting on student engagement, Paul (19/3/09), the Principal at Inner City PS, suggested that schools could readily become “dysfunctional” in a contemporary world if they maintained outdated approaches to education. He suggested that it was essential for schools to keep pace with change at a societal level and respond with curriculum and pedagogical offerings that were aligned with the life experiences and interests of young people. He commented:

When they say they disengage in the middle years, I don't agree. I think they just disengage from what we are interested in. We have to try and tap into that. They are naturally … they are intrinsically motivated and we just have to try and find out what that is.

The school leaders felt that personalised learning could be achieved through the development of new curriculum and pedagogical frameworks based on inquiry, project-based and problem-based learning models. To instil deeper motivation in students, they believed that students should be encouraged to set and pursue personalised learning within overarching curriculum frameworks. Associate Principal, Jennifer (5/12/08), at Suburban HS, suggested that the ultimate objective of the change agenda at her school was to “create an environment where kids could really get passionate and excited about learning”.

In order to improve student engagement, school leaders wished to provide students with opportunities to participate in individual and small group collaborative learning experiences that were framed around project- and problem-based activities and authentic tasks (Newman, 1992; Newmann, Marks & Gamoran,
The strength of connections with ‘real world’ contexts was thought to be particularly important in helping students recognise the value of what they were learning. Providing students with opportunities to communicate their learnings to authentic audiences (people from outside the school community) was also considered important. In summarising these objectives, Margaret, a leading teacher at Seaside SC, outlined the intentions behind the curriculum and pedagogical framework that she and her colleagues designed:

We have tried to develop this as the inquiry model. So really we want it to be from them [the students] – creating big questions, finding out things that they want to know in relation to the topic, with the ultimate aim of trying to educate someone else at the end of it. Taking it back to the wider community is what we really want (14/5/09).

Specifically at Suburban HS, the development of new curriculum and pedagogical frameworks was informed by the desire to support the language (vocabulary) development of their students – especially those from non-English speaking backgrounds. Due to the high numbers of students from non-English speaking backgrounds, the provision of opportunities for frequent conversation in English was considered to be an essential ingredient in future academic success. As a result, school leaders wished to create a socio-spatial context within which students and teachers could engage in regular in-depth dialogue. Associate Principal Jennifer outlined the importance of this oral aspect of the students’ learning experience:

Academic success is very important in this model. And the thread that I see supporting that is language because the kids come from homes where there are very few materials. There is very little talk and often the talk is about social things or family things. A lot of the kids have a very limited vocabulary. So a big impetus for me, through the curriculum, is language development (5/12/09).

A desire to change teacher practice was also central to the spatio-pedagogical projects in the case study schools. Associate Principal Jennifer (5/12/08), made it clear that changing teacher practice at Suburban HS was fundamentally linked to the desire to change “an entire culture of thinking about learning and how kids learn best”. The school leaders were resolute that teacher practice needed to change if any genuine socio-pedagogical progress was to be made—regardless of the characteristics of physical learning environments.

The most notable change to teacher practice sought by school leaders was a shift from teachers working in isolation to working in collaborative teams. This significant organisational change was common to all three schools. Having teachers work in teams of two to four with cohorts of 50-75 students was the desired approach. These social organisational structures were intended to enable teachers to spend more time working alongside students to support them in their learning, rather than “doing [learning] to
them”, as the Principal at Inner City PS described instructivist teacher-centred approaches (19/3/09). Such arrangements were expected to support a more equitable learning situation in which the diverse needs of individual students could be met.

Towards realising educational objectives

The desire of the case study school communities to tackle both innovative spatial and pedagogical objectives at once was ambitious. Indeed, the pursuit of new socio-spatial contexts for learning involved stepping into unchartered territory for these schools. In pursuit of these overarching objectives, these communities became entangled in intricate change processes that required the integration of myriad factors. Paul, the Principal at Inner City PS articulated the breadth and depth of these spatio-pedagogical projects when he commented that, “it’s not only the space that needs to change” (19/3/09). His short but salient comment encapsulated the tremendous scope of these projects. Had these projects only been spatial, and involved the replication of existing architectural typologies, they would have been complicated enough. Similarly, had they only been social, and involved the development of new pedagogies, they would have constituted significant undertakings. Combined, the scope was enormous.

The school leaders did not expect that changing teacher practice would be easy. In fact, they believed that many teachers would initially struggle to adopt contemporary pedagogies and/or teach in new socio-spatial contexts. During the initial phases of these spatio-pedagogical projects, school leaders witnessed strong resistance to change from some staff. In particular, the value of shifting to team teaching approaches was strongly disputed by some of the more experienced teachers. They expressed concern that the proposed changes would result in a repeat of their unsuccessful experiences of teaching in open plan schools during the 1970s. They believed that changing the physical and pedagogical contexts within schools was not a worthy undertaking. Peter, the Campus Principal at Seaside SC, relayed these sentiments when he said, “many of them have lived through teaching in large open plan spaces and felt that that wasn’t always a successful model” (14/5/09).

However, the school leaders insisted that the educational models they wished to implement were better developed and more highly structured than those that had been implemented during the 1970s. Associate Principal Jennifer, at Suburban HS commented that; “one of the problems I think with a 1970s curriculum – [a barrier] which people throw at me all the time – was that people said that it is ‘open’, explore what you will” (5/12/08).

The general response from school leaders to doubts surrounding the development of new socio-spatial contexts for learning was to invite teachers to create new units of work that fitted the new curriculum and
pedagogical frameworks they wished to see implemented. Peter, the Campus Principal at Seaside SC, described the impetus behind his school’s spatio-pedagogical project:

Initially the development of the Hub was driven by a grant we received to write integrated curriculum units and we wanted to find a space to teach, or create a space to teach, integrated curriculum with a range of students of up to about 75 students at a time. So that was the initial impetus. And the theme running through those integrated units was to be an environmental theme to match the overall philosophy and vision for this campus—which is to be a model school for environmental education … [in addition] we wanted to create a rich ICT environment … where we had fixed machines that the kids were able to access and have internet access and research ability (14/5/09).

By supporting teachers to create new units of work, school leaders wished to engage them as agents of change. Through this process, the school leaders hoped that teacher teams would think carefully about contemporary pedagogies and working with students in innovative learning environments. Associate Principal Jennifer, at Suburban HS commented that; “the team of teachers [will] have to think very purposefully about their role in the lesson in the learning space, as how they work with the students is going to be dictated by the learning space that they are in” (5/12/08).

Enhancing social connectedness across learning communities was another key objective. By combining teacher teams and innovative learning environments school leaders wished to create new socio-spatial contexts within which collaborative learning experiences could be facilitated. The development of new curriculum and pedagogical frameworks was expected to generate new forms of social interaction that were characterised by meaningful dialogue between students and students, and students and teachers – often in pairs or small groups. Associate Principal Jennifer, at Suburban HS described the potential value of this type of learning situation:

One of the big ones for me is collaboration, and that might be with the teacher. I'm not suggesting that all of the learning has to be student based or exclusive of the teacher. The teacher can move in and out of that collaborative model—working with a group of four here, and five there, or two, or whatever it is. And I think that is a really important part of the pedagogy … I think pairing is a very good model for our kids because it builds confidence and their capacity to share with a bigger group. But also the provision for kids to work independently … I like that as well (5/12/09).

Apart from the wish to create a new social dynamic, the combination of teacher teams and innovative learning environments was also intended to facilitate the integration of subject matter across learning domains (i.e. English, SOSE, Maths, Science etc.). To support students to identify connections between learning domains, teacher teams at the two secondary schools were composed of teachers who were trained in a range of related subject specialisations, for example Maths/Science/SOSE or English/SOSE.
At Inner City PS, where the primary school teachers were all generalists, teachers with different strengths and weaknesses were also matched.

**Context specific change?**

The school leaders in the case study schools identified their spatio-pedagogical projects as specific responses to the needs of their students and their local community. They believed that their projects were not generic or readily transferable to other schools. David, an associate principal at Suburban HS, communicated this sentiment:

> You are trying to think about what the school should be like for kids and what they should experience and you go backwards from there … If we were in a different suburb or a different neighbourhood it would be a different school … You know, schools are not all the same, which is fantastic. They need to be designed for the kids on their patch (7/11/08).

This statement appeared to be applicable to the specific components of each school’s spatio-pedagogical project. However, when viewed from a broader perspective, strong similarities were observed between the educational rationales of the three schools. To this end, I believe that the school leaders were responding to national and international educational/pedagogical movements when making decisions about changes to their ‘patch’. Later in this chapter I return to discuss these movements (see, ‘Developing a critical pedagogy of space’).

**Educational visions/intentions**

**Anticipated student and teacher behaviour**

Broadly speaking, school leaders hoped to create learning communities that exhibited internal social cohesion and external connectedness. They envisaged learning communities in which students and teachers shared ownership of the physical and conceptual environment and demonstrated intellectual respect for each other. Furthermore, they desired learning settings that were supportive of healthy student socialisation and they wished to create learning communities that were well connected to other school-based communities and to communities beyond school. Finally, they envisaged learning communities that could support sound academic achievement that could be achieved through a variety of learning modalities.

Paul, the Principal at Inner City PS, described what his vision for educating middle years’ students would look like:
What would it look like? Where I have seen this work, they [the students and teachers] would have barely noticed that we would have entered the room. They would be accustomed to people coming and going. Work would not stop if someone came in. The kids would be able to articulate what they were doing ... So if I asked, ‘what are you doing’, they would clearly be able to tell you ... It wouldn't be a quiet zone but it wouldn’t be a noisy zone. It would be productive noise and kids would actually monitor the noise ... It wouldn't be the teacher who was constantly telling them to settle down. It would be almost self-monitoring. There would be a variety of tasks happening within the one space. So if it was a maths session you would be seeing people with concrete materials, you would see students who wanted to work on their own in a space where they could do that, and you might see a small focus group with a teacher. The one thing you wouldn't see is the teacher as soon as you walked in ... What else will it look like? It would be bright. It would be well lit. Hopefully, it would be naturally ventilated. It would be clean. There would be a sense of pride on the part of the students and the teachers (19/3/09).

Associate Principal Jennifer, at Suburban HS described a similar vision:

What I hope is that it will be a really lively place. I would like to see movement. I would not like to see kids constantly sitting still and working in silence or in isolation. I would like to hear a hum of noise. I would not like to hear yelling and screaming, but a real kind of purposeful activity. And I would like to see people looking happy ... I want kids feeling safe and secure and that would be shown by them being absolutely comfortable in terms of their bodies and their manner and all of those things. I would like to see them learning in a variety of ways and I would really like to see them smiling and happy, but not hysterical. And the same things for the teachers (5/12/09).

At Seaside SC, the vision for education in the Hub was framed around the wish to support students to learn through a variety of interpersonal relationships and learning activities. Peter (14/5/09), the Campus Principal, described his vision for learning in the Hub:

First of all we wanted to create a point of difference. Something that physically looked and felt different to other spaces in the school, and we also wanted to make sure that people were able to work in teams and the kids could work in groups. Issues like problem solving and team work.

The vision for learning in the Hub was further elaborated upon by Margaret (14/5/09), a leading teacher at Seaside SC. She explained that the integrated curriculum designed for the Hub environment was created around an intention to run a variety of simultaneous activities under the umbrella of a themed topic. She recalled:

We were going to have dedicated areas. So when the students needed to be over here making bits and pieces, they would be able to go over there to use those materials and work on that—to flow to another space. And when they needed to be skilled on something, there could be an area set up for skills lessons [as well].
Common to these educational visions was a desire for regular student and teacher movement, both within and between differentiated activity settings. School leaders wished to create settings in which students could engage in both student- and teacher-directed activities. To this end, they envisaged learning environments that provided students and teachers with access to a range of social settings, resources, and tools (including ICT).

Also common to these educational visions was the notion that ‘explicit instruction’ still had a place within a more diverse pedagogical framework. Didactic teaching was considered suitable for instruction regarding particular skills, although not considered a valid approach for teaching students about subject content. The development of knowledge regarding a particular topic was expected to be gained by students through student-directed activities and dialogue. Constructivist and social constructivist approaches were favoured because they were expected to support the development of students’ capacities for independent and life-long learning.

*Breaking down conceptual walls*

The creation of larger scale and more open learning environments was seen by school leaders as symbolic of ‘conceptual walls coming down’. Allan (26/8/09), a leading teacher at Inner City PS, described his perspective on this notion:

> The walls that need to come down are the walls in your head. So for me, the learning space … is really just a symbol of what has happened in my head.

Some of the most significant ‘conceptual walls’ that school leaders wished to demolish were those they associated with traditional school architecture. When presented with the opportunity to rebuild or refurbish existing buildings, the school leaders saw this as an opportunity to make significant changes to school organisational structures and overcome the organisational limitations that had been imposed upon them by cellular classrooms. They especially wished to move on from the single teacher and 23-28 student classroom model. When provided with the opportunity to instigate change, they wished to develop new organisational structures and embody these in new architecture.

The new organisational structures they envisaged required changes to a number of interdependent components: student and teacher groupings (who), the built environment (where), and the timetable (when). I explore the relationships between these and other components later in this chapter (see ‘The design process’).
Factors that informed the educational vision

Limited literature on learning and space

School leaders sparingly cited literature as a source of inspiration for their educational visions. They reported that literature about the relationships between learning and space was not readily available to them. Associate Principal David, at Suburban HS stated:

The literature is not fantastic on any of this … I mean there is a lot of literature about teamwork, collaborative learning and all those sorts of things … but in-line with schools [and school facilities] that already exist—and this model [being developed at Suburban HS] doesn’t really already exist …We know what collaborative learning is from the literature and all that, but this is different. It is a much different model (7/11/08).

The literature that school leaders did cite regarding middle years education included the Department of Education and Early Childhood Development (DEECD) resources, ‘Principles of Learning and Teaching’ (PoLT) (DEECD, 2009a) and the ‘E5 Instructional Model’ (DEECD, 2009b), the basic tenets of which were described in Chapter Two.

Although these resources supported the educational visions of the school leaders, they were confronted with the problem of how to translate these educational frameworks into pragmatic actions ‘on the ground’. When faced with the task of introducing new teaching and learning practices, they quickly recognised that implementing change of this type would be difficult without the support of new physical environments.

Making their task troublesome was the fact that literature regarding the relationships between contemporary learning theory and the physical environment in schools was scarce.

School visits – investigating contemporary education models

Rather than rely on literature, school leaders conducted visits to other schools around Australia to investigate contemporary models for education and innovative learning environments. The school leaders at Suburban HS also visited schools in New Zealand, England and the United States. These first-hand experiences further informed their visions and provided cautionary warnings about what not to do when developing new socio-spatial contexts for learning.

To appease teacher concerns regarding the creation of radically different education models and learning environments, school leaders sent teachers to visit other schools, such as the Australian School of Mathematics and Science (South Australia), Canning Vale College (Western Australia) and Wooranna Park Primary School (Victoria). School leaders hoped that such visits would inform their staff about
innovative and successful spatio-pedagogical projects being undertaken elsewhere and enhance their understandings of contemporary education pedagogies and learning environments. They hoped that teachers would begin to make connections between curriculum, pedagogy and space, and subsequently become more engaged in their schools’ spatio-pedagogical project.

Developing a critical pedagogy of space

Responding to contemporary society

It appeared that the educational change agendas observed in the case study schools were ideological responses to broad movements, or changes, in societal circumstances: changes characterised by globalisation, technological advancement, the exponential rate of information production, and the creation of new labour markets (Monahan, 2005). The education models that the school leaders sought to develop focussed on providing students with an academic and social education that could support their participation in contemporary society. A key objective was to create educational contexts that provided students with opportunities to better understand themselves as learners and acquire skills for life-long learning.

Informed by constructivist educational theory, school leaders envisaged a schooling experience that could support students to develop the necessary skills to deal with uncertain futures – futures characterised by regular change in everyday life and in the workplace.

For example, at Seaside SC (20/8/09), the consensus among the school leaders, as well as the teachers selected to teach in the Hub, was that middle years education should focus on preparing young people to be responsible, active, productive and happy members of society – people who felt empowered to make a change in the world and who could make responsible and informed decisions. Enabling students to do this was thought to involve encouraging them to challenge ruling paradigms and think for themselves.

This same group of educators acknowledged that young people required certain skills and abilities to support their future endeavours. The schools’ role in supporting this was thought to involve aiding the development of students’ academic and ‘real life’ knowledge and skills, while supporting them to become life-long learners. Being confident to try new things was also considered essential for the development of independent learning skills. The qualities of an independent learner were identified as being able to; ask good questions, inquire, access information, find appropriate ‘experts’, solve problems, be creative, think critically, and be able to deal with problems or adversity. In addition it was thought that students needed good social skills so they could work effectively in collaborative situations. Communicating ideas, interests
and needs, and the ability to plan goals and achieve positive outcomes were all considered important skills to develop. These aspects of education were thought to be encouraged by making connections between school and the ‘real world’. The teacher’s role was thought to encompass passing on knowledge and skills and providing students with a range of experiences that would frame future decisions and actions.

I observed clear parallels between these and similar perspectives and Bruner’s (1996) ideas about what makes education valuable to students. As discussed in Chapter Two, Bruner promoted forms of education that were contextualised within cultural settings. He considered the value of education to be closely linked with the cultural situatedness of meaning making, or learning. He suggested that the cultural situatedness of meanings was what made them readily communicable with others, and that this ability to communicate meanings was what made them useful to the learner. The school leaders’ intentions to create new socio-pedagogical cultures that were well connected to other school-based learning and ‘real world’ communities resonated with Bruner’s theories.

**Links to the literature on critical pedagogy**

In the process of working towards the creation of new educational models, school leaders promoted many ideas that were linked with the literature about critical pedagogy. Although this literature was foreign to them, many parallels were evident between their educational visions and the literature. In keeping with the conceptual underpinnings of critical pedagogy, school leaders wished to engage in processes of cultural change and create educational settings that could support the development of new types of relationships and forms of communication between students and students, and students and teachers.

The collective desire for ‘connectedness’ was closely related to ideas embraced by critical pedagogues concerning the cultivation of education that called on the cultural resources that people brought to school. Indeed, the resources and tools that the school leaders wished to see students using, especially those related to ICT, provided a clear sign of their desire for students to engage in learning that involved regular interaction with people, communities and ideas in the ‘real world’. Furthermore, the vision of the school leaders was one that promoted democratization of the learning situation.

Aspects of Freire’s work (1970; 1973) concerning the promotion of ideological critique, analysis of culture, and attention to discourse, was embodied in the educational visions of the school leaders. Freire’s notion of the teacher as an intellectual or cultural worker (Leonardo, 2004) was manifest in the roles that the school leaders had in mind for teachers. Evidence of this was seen in their desire for teachers to work alongside students to support them in their learning, rather than act as instructors in the delivery of
prescriptive curricula. Furthermore, the team teaching structures that school leaders wished to implement were intended to promote pedagogical relationships that were based on collaboration.

Although school leaders did not communicate the view that democratization of these school settings was intended to result in the democratization of society, they did express concern for social justice and a wish to empower students to become reflective individuals who could undertake informed action to improve their lives and the lives of others. Allan, a leading teacher at Inner City PS, communicated these sentiments:

I really, really, firmly believe that the basis for all learning in individuals is self-esteem, and how you feel about yourself. It's about your identity, where you fit in the world, where you fit within your community and culture. It's those opportunities that I think are the ones that I try to seek out and use as the basis for learning (26/8/09).

Through the process of re-visioning educational models, and creating new learning environments to support these visions, the school leaders inadvertently responded to calls for a ‘critical pedagogy of space’ (McLaren, 1998; Fisher, 2002). Without having encountered the theoretical arguments put forward for a critical pedagogy of space, school leaders sought to create new socio-spatial contexts that “challenged carceral systems of social control” (McLaren, 1998, p. 454). Furthermore, their ideas about how students and teachers should interact and behave at school were entangled with ideas about social control and issues of spatio-pedagogical power. Indeed, they wished to create new forms of spatiality in their schools that were in stark contrast with the previous space/time/being practices that had existed within cellular classrooms.

Although spatiality was not a term familiar to school leaders, they were not ‘unconscious’ of the space/time/being practices in their schools (Fisher, 2002). Their desire to change prior practices was driven by preferences for pedagogical approaches based on inquiry and project- and problem-based learning. In order to successfully employ these pedagogies, school leaders believed that socio-spatial contexts that afforded students and teachers freedom to engage in frequent discourse were required. Further to this, they believed that learning environments that facilitated movement within and between differentiated activity settings were also required. hooks’ (sic) (1994) ideas related to the ‘engaged classroom’, ‘always changing’ and being ‘dynamic’ and ‘fluid’ were evident in the educational visions of school leaders. Associate Principal Jennifer, at Suburban HS, shared her ideas about spatiality while discussing the shared ownership of space:

A big factor, I think, is having beautiful spaces and telling kids that they are their spaces and they need to care for them … So it is more of a model of sharing and caring for the learning in that space together, rather than the teacher trying
to act as some sort of policeman who is maintaining students in terms of their behaviour and their responsibility (5/12/09).

Although the school leaders were readily able to articulate educational visions, they were not readily able to envisage the physical environments that might support their educational objectives. Their visions and ideas about new pedagogies and social/organisational structures were not complemented by clear ideas about what building structures, interior design elements or furniture items might support these visions. In order to design environments that could support for their ideological, sociological and pedagogical goals, collaboration with design professionals was required.

**The design process**

In this section I discuss how school leaders, in collaboration with design professionals, created innovative learning environments to support their educational visions.

**Spatial design: a catalyst for re-visioning pedagogical practice**

When describing their educational philosophies and visions for learning, school leaders were more inclined to talk about curriculum, pedagogy, and assessment than discuss architectural design and its influence on learning. This was perhaps not surprising as they had little or no experience with participating in school building projects.

However, through the process of working with design professionals, school leaders recognised that carefully designed learning environments could influence the socio-pedagogical cultures in their schools. Indeed, one of the ideas that emerged during this process was the idea that space could play a role in shaping pedagogy. This notion reflects the theory of architectural determinism (Bailey, 1975; Leach, 1997; Marmot, 2002) and has clear parallels with Monahan’s (2005) concept of ‘built pedagogy’. Informed by this idea, the school leaders sought to shape pedagogy by designing spaces that were distinctly ‘different’ from traditional classrooms. This approach to school design catalysed a process of re-visioning pedagogical practice and led the school leaders to broaden their thinking regarding the development of new education models.
**Intended influences of innovative learning environments: shaping pedagogy**

The school leaders were not interested in providing flexible spaces that could be reconfigured in multiple ways. They felt that learning environments that could be too readily reconfigured would allow teachers to regress to didactic instruction as the default pedagogical approach. Associate Principal Jennifer, at Suburban HS commented:

> We want the space to prevent people, in a way, from determining what they are going to do in the space. We don't want flexible spaces in that sense. We want a variety of spaces that you can move through, and into, depending on what type of learning needs to occur - rather than saying that I'll change the shape of the space to suit what I want to do, because then you don't get a change in pedagogy (5/12/09).

The Campus Principal at Seaside SC, also commented on this approach to design. Based on his experiences visiting other schools, he expressed the view that flexibility (associated with relocatable furniture) often led to a lack of structure and a meaningless environment:

> It's a real challenge, these spaces, because you can make it so flexible that it really means nothing. I've been to lots of these spaces that simply have a lot of ratty furniture that you can move around in various formations but [they are] essentially pretty conservative and unstructured and it always looks like a disaster ... What I'd like to see is clearly defined spaces that almost lead you through the space and have different purposes, so there's the ability to do a range of things in the space—with high quality fit out and furnishings for that particular aspect. What I don't want to see is like 200 chairs that you stack up on the side of a wall ... a) it's not realistic to expect kids and teachers to constantly move and reset them, b) it doesn't look very good anyway, and c) they tend not to get cared for so you end up with damage. So I want something that is quite artistic and sculptural and multilayered and arr ... flexibility, but flexibility in more where you move to the space rather than just leave an open floor ... and the more radical and different it is the better (Peter, 14/5/09).

A focus on contemporary approaches to middle years’ education led school leaders to desire a variety of spaces that could support a mix of constructivist and instructivist pedagogies. Associate Principal Jennifer, at Suburban HS commented:

> The learning spaces will not allow for everybody to be engaged in transmission teaching all the time. There can still be some of that going on – and I'm not saying that there is not a place for that, there certainly is a place for the teacher as the expert and to provide a framework for things – but there are a lot of spaces that will not allow that to happen and insist upon the student leading the learning. So in some of the digital workspaces for example, there is no room for the teacher to position themselves at the centre—they have to be on the side and the students have to be the focus (5/12/09).
Aided by design professionals, the school leaders wished to create some spaces that could support small and large group collaborative experiences and other spaces that could support didactic instruction. They wanted the collaborative spaces to be designed in a way that limited opportunities for instructivist pedagogies. They expected the teachers to assume the role of a learning facilitator who would provide students with curriculum frameworks that would support them as self-directed learners. However, to facilitate knowledge transfer pertaining to particular skills (but not subject content) they wanted additional spaces designed specifically for instructivist pedagogies. In these environments, the teacher’s role was expected to be that of instructional expert.

School leaders expected the innovative learning environments to be the agents of change and anticipated the environments would play strategic roles in supporting their educational visions. With the creation of these environments, school leaders hoped to support teachers to learn about, and adopt, contemporary educational practices that were informed by constructivist educational theory.

School libraries were identified by school leaders as good general models of contemporary learning environments. The differentiated layouts frequently found in libraries were admired because of the range of pedagogical encounters they afforded. In particular, the zoning of activity settings within large spaces was a design concept that appealed to the school leaders. Peter, the Campus Principal at Seaside SC, commented:

I think the best example of a space that’s operating well, with a little bit of flexibility, is our library … You need to be able to formally move a group of kids from one activity to another but also there needs to be some need for independent movement and for teams to operate independently in that space as well. So you know, line of sight and visibility is still an issue … and [so is the] overall management of the kids … obviously there’s [also] issues about light, there’s issues about acoustics, and there’s issues about ICT (14/5/09).

The school leaders also believed that the creation of ‘beautiful’ spaces was important. They felt that aesthetically appealing buildings and furniture items would encourage students and teachers to care for their surroundings and want to be at school. In addition, attractive facilities were thought to have a positive influence on a school’s culture and even inspire members of a school’s community. Associate Principal David, at Suburban HS commented that, “we all thought the buildings had to be beautiful … Now that might not have a lot to do about pedagogy, but it has a lot to do with culture and aspiration” (7/11/08).
Designing innovative learning environments: a process of spatio-pedagogical change

A holistic view of change

Through collaboration with architects and interior designers, the case study school communities designed learning environments they expected would support their educational objectives. These collaborative design processes required significant effort and persistence from many people, particularly the school leaders. Their commitment to holistic change was a significant factor in the creation of learning environments that contrasted with traditional notions of how schools should be designed. It is unlikely that such spaces would have been created without the strong conviction of the school leaders that changing the learning cultures and educational models in their schools was necessary. Conversely, had the opportunity to create new learning environments not been available, it is unlikely that school leaders would have been able to pursue their educational visions to the same extent. The questioning of pre-existing norms associated with the social, spatial and temporal organisational structures in schools ultimately led to the creation of innovative facilities.

The time frames for design in each of the case study schools were vastly different. This was due to the scale of each building project and the level of involvement that designers had in the spatio-pedagogical projects at each school – in particular, how committed the architects and interior designers were to understanding the educational visions of the school leaders and how willing they were to work with them to create environments that could support these visions.

A common language and shared understandings

Once a common language for communication between school communities and design professionals was established, collective understandings about education and ideas about design could be shared. Productive collaboration was identified in situations where a common language was established and a process of cyclical testing, accepting and rejecting of design ideas was part of the design process. Timothy, the Principal at Suburban HS, described the design process at his school as “really purging” (7/11/08):

We went through this really purging process in our own thinking … propositions were put up and tested and accepted and rejected. Focus groups of teachers were developed and they seemed to be endless. But they were a very healthy part of the process – that was the reflection that I have on them …. I think it took over two years in order to come to some sort of a design that we thought we could live with. And that seemed like a long time, but when you look back I think it was right. The writing and the thinking and the building and this merger of people in this notion of, ‘What are we going to deliver and how are we going to deliver it?’, was due to the talk before the drawing (7/11/08).
I think the challenge for them [the architects] and us [the educators] was around language and concepts to start with. I mean, architects will say, ‘Give us a brief, give us a brief, give us the brief’. But we didn't know what the brief was ... And they were very open and honest about how they were not going to give us one. And I've seen architects do that before and I feared it coming. We all did, but it never came. And indeed, apart from a few players, there would not have been a pen put to paper for 12 months. And that was the right thing to do (7/11/08).

Indeed, Timothy insisted that nothing could be drawn (architecturally) until a firm picture of what the school really wanted to do organisationally and pedagogically was established. He thought that drawings created too early in the process would shape people’s thinking about how the school should operate and how students should engage in learning. His insistence suggested that he recognised the influence that space could have on the school’s operation and pedagogical practices.

Ownership of space during the design phase

Participation of school leaders, teachers and students in the design phase was found to positively influence their feelings of ownership of their new facilities. Extensive consultation with the future users of new facilities was found to be beneficial for two primary reasons: firstly, teachers and students were able to contribute valuable ideas that informed the design of the learning environments, and secondly, their involvement enabled them to develop early understandings of what their new spaces would look like and how they might use them. Through ongoing participation in the design phase, teachers in particular did not have to wait until the buildings were constructed to begin developing ideas about linking curriculum, pedagogy, and assessment practices with innovative spaces.

Timothy, the Principal at Suburban HS, described the process of creating new facilities for the 2000+ students at his school as “frightening” (7/11/08). However, working through the design process enabled both him and his leading staff to become empowered to deliver the innovative facilities they believed would serve the best interests of the school’s students and teachers. Higgins et al. (2005, p. 12) identified issues of empowerment and spatial ownership in their review of the literature about school design. They identified a number of studies that suggested that “users are generally empowered by understanding and altering their environments”. Timothy communicated the sense of empowerment and ownership that he experienced during the design phase in the following statement:

The parallel of merging the school and creating a new pedagogy, a new curriculum design, new physical design, is an unbelievable task, although it felt good that we were first. We are the pioneers of this and we have watched others kind of borrow our stuff and struggle with the same struggle … We don't want to be following other people's agendas and this was an opportunity to
spring out on our own. And that is the story that in the end is going to be told about this place (7/11/08).

Through their lack of participation, many teachers demonstrated they were not particularly interested in being involved in discussions regarding the design of their new facilities, even when provided with opportunities to make contributions. Teachers who were interested also appeared to be distanced from these discussions because they had difficulty imagining architectural plans in three-dimensions, or because they felt distanced by the social structures that surrounded the design process at their school. Gina, a teacher at Seaside SC, expressed her frustration regarding her limited involvement in the (original) design of the Hub:

We didn’t really know what the space was going to look like. We were told to come in initially and show what we thought the space should look like. So I actually foolishly thought that we might get some input. And then it was like no, it’s just a barn (14/5/09).

Designing the Hub at Seaside SC

At Seaside SC, teachers, but not students, were consulted in a limited way about the (original) design of the Hub. For the most part the decisions concerning the design of this space and the redevelopment of the campus were made by a small team composed of the school leaders, the architects, and representatives from the Department of Education and Early Childhood Development (DEECD). In justifying this approach, the Campus Principal, stated:

Each individual teacher was consulted as part of the design process, but in the end we had a small design team, including myself, where we made the final decisions about the use of space. Beyond that the department had a reasonable influence on the creation of some of the spaces and in particular the creation of the Hub. So, I think it’s safe to say that none of our staff would have voted...they would never have agreed to build a Hub...none of our staff (Peter, 14/5/09).

Limiting consultation with staff at Seaside SC may have been a tactic to avoid confrontation with ‘conservative teachers’ over issues associated with the creation of innovative spaces, including the Hub. As previously reported, some teachers held strong views about 1970s open plan learning environments and did not wish to see such spaces recreated. Nevertheless, the Campus Principal reported that the creation of the Hub was driven by an ideological position held not by him, but by bureaucrats at DEECD. He stated that the space had been imposed upon the school:

We have to put the creation of the Hub space in context and initially it was quite a conservative space for classrooms. Then within a very short time period, maybe a fortnight, we were told that – by the department – that we would need to create something more creative [in order to attract funding] … and I can still
recall the day when a plan was put on the table and it was ‘how can we make it more creative?’ and the consultant from the department simply took the four walls out and said there is your creative space (Peter, 14/5/09).

The DEECD directive at Seaside SC resulted in what turned out to be a problematic lack of ownership over the space that became known as the Hub, during both the design phase and the first three years of occupation (see Chapter 6 for details). The bureaucratic imposition of the Hub meant that there was insufficient time for the pedagogical thinking that was needed to effectively fit out and make good use of this space. Peter, the Campus Principal, elaborated on these sentiments:

Educational philosophy drove the desire of the state education system to create spaces like this, but in the school context it was a decision that was imposed and the timeline was incredibly short to come up with a solution for this space. And in any case there was no resourcing at all to do any interior design work in that space. So in the context of building a new school in a hurry … a twelve, eleven and a half million dollar project, there was not the sort of level of thinking put in here that you might like to have had (14/5/09).

The findings from Seaside SC suggest that for innovative learning environments to be successful, they must be informed by clear educational visions, and that such visions should be inclusive of well developed ideas about social organisational structures and pedagogical practices: a view purported by Higgins et al. (2005, p. 3), who concluded:

… it is the extent to which, and the ways in which, school users are engaged in the school design process that determines the success or failure of the resulting design. The message is clear. School designs cannot be imposed nor bought off-the-shelf. Success lies in users being able to articulate a distinctive vision for their school and then working with designers and architects to create integrated solutions. The open-plan classroom movement showed that purely physical design solutions that are not owned by their users or supported with effective systems and behaviour change will not work.

When first created, the learning environment in the Hub was an anomaly at Seaside SC. Certainly the space was not part of the educational vision that informed the rest of the campus. This vision for the school prioritised sustainability education, not constructivist pedagogical practices or moving away from traditional classroom arrangements. Peter, the Campus Principal, commented:

This [the creation of the hub] was done in a rush with little thought to how we might use the space … once that was imposed upon us we had to do some thinking about how we would utilise the space. But umm…not the sort of long term thinking that you would ideally like to have…not the long term pedagogical thinking that you would like to have (14/5/09).
Margaret (14/5/09), a leading teacher at Seaside SC, ratified these sentiments. She suggested that, “We didn’t really, as curriculum writers, have control of what was being built. We didn’t have a say. That ‘say’ had already been decided”.

The other problem that plagued the development of the Hub at Seaside SC was the limited funding – particularly for the interior design and furniture. The school leaders identified funding models that financed little more than the ‘shells’ of cellular classrooms and the purchase of tables and chairs as inadequate when it came to creating innovative learning environments. They believed that for innovative spaces to be successful, good interior design was essential. Furnishing open or interconnected spaces with only tables and chairs was not considered adequate. Margaret, a leading teacher at Seaside SC, lamented the lack of funding for the interior fit-out of the Hub:

That’s a money issue and there was no money. So it was a matter of salvaging. So these tables and chairs that are here are not intended to be the furnishings, but there hasn’t been the money to buy any new ones. So it all comes down to the dollar. And they were intended to be brand new computers and they weren’t (14/5/09).

Well developed educational models should inform design

Across the three case study schools, the school leaders believed that developing education models to suit innovative spaces was clear evidence that a spatio-pedagogical project was proceeding in the wrong order. They suggested that education models, based on well developed curriculum and pedagogy frameworks, needed to be developed prior to designing innovative learning environments. In situations where innovative spaces were created before education models were articulated, school leaders expected that problems would inevitably occur due to misalignment between space and practice. Assistant Principal Clare, at Suburban HS, commented:

It is really important that you start with your teaching and learning first. What is the teaching and learning experience that you want to provide? What do you as a school value about learning? That is the discussion that you have to have before you even start talking about buildings. I think if you start with the buildings first then you are in big trouble, because … the building has an incredible power to confine what you are trying to create. So I think you have to have a clear understanding, even before you go through the architect process, of what is the learning that you value, and what is the learning that you want your students to have (16/9/09).
Student contributions to design

At Inner City PS and Suburban HS, observation of students participating in design processes illustrated the positive influence they may have on the creation of new learning environments. Their participation revealed they had well developed understandings of basic design concepts and an ability to apply these concepts to their own situation.

Student contributions to design at Inner City PS

At Inner City PS, the Year 5/6 students participated in a number of activities through which they explored ideas about interior design and furniture selection. Some of these activities were led by me, as a participant in the PAR phase of the study. As mentioned in Chapter Four, these activities included an afternoon session during which students discussed ideas about the interior design of their new spaces and drew pictures and plans to depict the furniture items that they wished to see purchased. Subsequently, as part of a maths unit on measurement, a group of 20 students measured the newly refurbished Year 5/6 area, drew plans to scale, and inserted their own furniture layouts into the spaces. Three of these plans are shown below (see Figures 75-77).

Figure 75. Student interior design and furniture concept (A) – Inner City PS.
Figure 76. Student interior design and furniture concept (B) – Inner City PS.

Figure 77. Student interior design and furniture concept (C) – Inner City PS.
The discourse generated by these students and the work produced played an important role in the design process that followed. Their contributions were compiled and later reviewed at a meeting held to discuss the furniture layout for the new spaces. At this meeting, led by Craig, a teacher at Inner City PS, and attended by a representative group of eight students, the Chief Investigator of the Smart Green Schools project and me, the students demonstrated good understandings of the planning concepts that I had introduced to them earlier, including ideas about zoning, activity settings, and flow. In addition, they made many suggestions about how different settings within their new learning environment might be used.

Discussion at this meeting led the teacher to draw a plan on the whiteboard that depicted the desired activity settings/zones (see Figure 78). The general concepts devised at this meeting with the assistance of students were incorporated into the final furniture layout for the Year 5/6 learning environment. Evidence for this can be seen when comparing this plan with the furniture layout that was approved by the school’s Principal, in consultation with the school council (see Figure 42 in Chapter 4).

![Figure 78. Photograph of interior zoning plan informed by students. Inner City PS 15/5/09.](image)

**Student contributions to design at Suburban HS**

At Suburban HS, a cohort of 50 Year Seven students assisted with the design of the SWiS buildings and contributed to the planning for occupation of these facilities. Working in the prototype learning
environment that was set up for ‘pedagogical experimentation’, these students participated in a term-long research project to investigate a variety of topics related to learning environments. Students worked in the following teams: welcoming team; past, present and future team; building team; interior team; and environmental team. At the culmination of the project, their collective research was communicated to school leaders and the interior designer who worked on the SWiS buildings via a presentation. The information that the students presented was fed directly into the design process. In addition, the conduct of this research project in the prototype learning environment supported the development of students’ and teachers’ understandings of what it might be like to work within their new facilities and offered them opportunity to develop new practices.

**Architectural responses**

When asked, students from across the case study schools used the following terms to describe their new facilities: big, different, open, large, exciting, colourful, sometimes noisy, light and bright, ‘cool’, interesting, comfortable, fun, spacious, relaxing, and modern. They also suggested that their learning environments were technology rich, allowed for freedom of movement, provided different spaces for people to move to, provided good access to belongings and resources, were very spaced out, were not too enclosed, provided ‘air to breath’ and good chill out spaces, enabled people to see what was going on, allowed large groups to get together, provided good private spaces, allowed people freedom to work with friends, and provided good spaces for talking.

In the following section I discuss the characteristics of the learning environments that were created in the case study schools. In doing so, I briefly outline some of the common design responses that made these environments innovative, including those associated with the refurbishment of the Hub at Seaside SC (refer to Chapter Four to view plans and images).

**Learning landscapes**

To provide the social organisational structures that school leaders desired, large ‘learning landscapes’ (Neary, 2010) were created to accommodate cohorts of up to 75 students and four teachers. These learning landscapes were not simply large open rooms, but environments differentiated by sub-spaces of varied sizes. These sub-spaces were distinguished by their full or partial enclosure, by changes to floor and/or ceiling heights, and by the arrangement of interior elements and furniture items. While some sub-spaces were designed as traditional classrooms, the majority of floor space within these learning environments was allocated to other settings, including collaborative work spaces (learning commons),
large group gathering/presentation spaces, targeted teaching areas, wet/project areas, formal and informal discussion areas, and quiet work/reading areas.

**Purposeful activity settings**

The creation of sub-spaces within learning landscapes responded to the general desire to create physical settings that could support specific pedagogical encounters. ‘Purposeful activity settings’ were created to support learning experiences that were characterised by specific learning activities. Specific interior elements, furniture items, ICT devices, and learning resources enhanced the purposefulness of these settings.

The annotated floor plan of the Hub at Seaside SC illustrates how ‘purposeful activity settings’ were incorporated into a ‘learning landscape’ with the refurbishment of this space (see Figure 79).
Figure 79. Seaside SC: The Hub refurbishment floor plan – annotated (Building B – First Floor).
Interconnectedness

Possibly the most striking characteristic of these learning environments was their ‘interconnectedness’. This characteristic was manifest in a number of ways in the different schools. At Suburban HS, the middle years learning landscape on the first floor allowed people to move between settings without encountering doors, apart from when entering the two traditional classrooms. At Inner City PS, the Year 5/6 learning environment enabled occupants to ‘open up’ or ‘close down’ sub-spaces using large glazed doors, thus facilitating visual connectedness while providing acoustic separation between activity settings. At Seaside SC, the refurbishment of the Hub included the creation of a small ‘house’ in the centre of the learning environment. This structure segregated the space into a range of smaller settings, while also allowing easy movement between them.

Integrated circulation

To support ‘interconnectedness’ within these learning landscapes, circulation routes were largely integrated with learning areas. This design response was intended to support a flow of activity and allow students and teachers to readily access a range of settings. Provision for (supervised) movement between activity settings was desired so that students and teachers could access both physical and virtual resources as required.

Dedicated teacher spaces

Unlike in traditional classrooms, dedicated teacher spaces, such as teacher’s desks, were not placed in learning environments. This design response was informed by the concept of democracy and the idea that ‘everywhere should be a learning space’. It was also supported by the notion that teachers should work alongside students to aid them in their learning, rather than operate from the front of the class, or from behind a desk.

To support collaboration between teams of teachers, dedicated staff study areas were created. At Inner City PS a dedicated teacher collaboration space was positioned adjacent to the Year 5/6 learning environment. At Suburban HS, a staff study and kitchen were incorporated into each SWIS building. While at Seaside SC, the co-location of teachers who worked in the Hub was not achievable because of the existing traditional faculty-based organisational structures that supported the operation of the rest of the school.
**Varied furniture and fittings**

Tables and chairs were predominantly the furniture items chosen to fit-out new learning environments. Tables of different sizes and shapes were chosen to create a variety of social settings. For example, the inclusion of small round tables at Suburban HS was intended to support small group discussions and student-teacher meetings. In addition, the selection of large oval tables was intended to create a setting for the ‘targeted teaching’ of six to eight people. At Inner City PS and Seaside SC, tables of non-conventional shapes were selected. These were chosen because they could be configured in multiple ways, and were thus expected to support a range of pedagogical encounters. It was not expected that they would be relocated frequently.

Other furniture items and built-in architectural fittings were also chosen to fit-out new spaces. Ottoman stools (padded), built-in bench seats (padded) and tiered seating structures (carpeted and non-carpeted), were incorporated into a range of activity settings. These seating types were expected to support large group gathering/presentation spaces, formal and informal discussion areas, and quiet work/reading areas.

Storage solutions that provided students and teachers with ready access to resources, and in some instances divided the learning landscapes into sub-spaces, were also integrated into new spaces. Storage units included fixed cupboards, mobile shelving units, and roll-away resource trolleys, including laptop computer trolleys.

**Integrated resources and tools (including ICT)**

Learning landscapes were designed to provide ready access to physical resources, such as books and craft materials. At Inner City PS, these resources were made available to students upon initial occupation of their new spaces. Meanwhile, at Suburban HS and Seaside SC they were still working towards ubiquitous provision of such materials when the field-work for this project concluded (see Chapter 6 for discussion of this issue).

These environments were also designed to be rich in ICT. Buildings were fitted with wireless and fixed-line internet infrastructure to support current and future use of devices such as desktop computers, laptop and hand-held internet enabled devices such as iPod Touch’s. In addition, learning environments were also equipped with interactive whiteboards and data projectors (with sound).
Acoustics

A range of acoustic materials/treatments was used to dampen noise reverberation and volume. At Suburban HS, extensive acoustic panelling was installed in the ceilings of the SWiS buildings. At Seaside SC, acoustic baffles were applied to, and hung from, the ceiling in the Hub, and sound-dampening pin board material was affixed to the west side of the central ‘house’. These acoustic treatments were retro-fitted to combat the poor acoustic properties of the Hub as originally designed. At Inner City PS, no specific acoustic materials were used, but the inclusion of glazed doors enabled users to acoustically separate different zones/settings as required.

Light

With respect to pedagogy, the ability to control the amount of light in various activity settings was identified as important. As these learning environments were designed to be flooded by natural light, blinds were installed to allow users to control light intensity and reduce glare. The provision of blinds ensured that students could read books, computer screens and interactive whiteboards. It also enabled some activity settings to be darkened to support theatrical activities.

Conclusion

In this chapter I addressed the first of the subsidiary research questions: How are contemporary constructivist middle years pedagogies influencing the design of teaching and learning environments? In doing so, I reported and discussed findings associated with the spatio-pedagogical projects undertaken in the case study schools.

Drivers for change

When exploring ‘why’ the school leaders wished to create innovative learning environments, I found the overarching driver for spatial and pedagogical change was a desire to improve the overall experience of school for middle years students and their teachers. To this end, school leaders wished to provide dynamic and supportive learning settings that could support students’ academic and social development.

Specific drivers for change included the belief that the ‘cells and bells’ model of education was leading to poor student engagement and holding back pedagogical innovation. To address this problem, school leaders wished to develop new socio-spatial contexts for learning that could support personalised
learning and the development of students’ life-long learning skills. In addition, they wished to encourage the adoption of contemporary middle years’ pedagogies, support the integration of subject matter across learning domains, develop learning communities that exhibited internal social cohesion and external connectedness, and create a schooling experience that was engaging, meaningful and valuable to students in today’s globalised society. I discovered that these courses of action aligned with calls from academics for a ‘critical pedagogy of space’ (McLaren, 1998; Fisher, 2002).

*Design process*

When exploring ‘how’ school communities went about creating innovative learning environments, the research findings revealed that the commitment of school leaders to holistic change was a prerequisite to creating innovative spaces. Their questioning of pre-existing norms associated with the social, spatial and temporal organisational structures in schools opened opportunities to explore new socio-spatial contexts for learning. Rigorous collaboration between school communities and design professionals, including extensive consultation with teachers and students, was integral to the design process and set the direction for social and cultural change in the case study schools. Ownership of space during the design phase was found to be important. Working through the design process not only empowered school communities to deliver innovative facilities, but also helped them to imagine new educational futures.

School leaders sought to embody contemporary approaches to middle years’ education in the design of learning environments. They did not want flexible spaces that could be reconfigured in multiple ways. Rather, they desired a variety of interconnected activity settings that could sustain small and large group collaborative learning experiences, individual work and some didactic instruction. They also wanted aesthetically appealing facilities. This quality was believed to have a positive influence on a schools’ culture and to inspire aspiration among members of a schools’ community. With clear parallels to Monahan’s (2005) concept of ‘build pedagogy’, school communities and designers embraced the notion that spatial design could play a role in shaping pedagogical practice. Subsequently, innovative learning environments were expected to act as agents of change.

A key finding of this research was that cultural understandings about educational practices, particularly those associated with pedagogy, were reviewed, developed and transmitted via architectural design processes. My analysis showed that rigorous collaboration between educators and design professionals led not only to innovation in school design, but assisted the development of systems of knowledge and behaviour (Smith et al., 2008) associated with educational philosophies and practices. Furthermore, my analysis revealed that when curriculum and pedagogy frameworks were developed in conjunction with the design of new spaces, new socio-spatial contexts for learning could be developed that went well beyond
earlier imaginings of educational visions. This conclusion concurred with that of Higgins et al. (2005, p. 6), who stated:

There appears to be a strong link between effective engagement with staff, students and other users of school buildings and the success of environmental change in having an impact on behaviour, well-being or attainment. The ownership of innovation, in contrast to the externally imposed solution, appears to tap directly into motivational aspects which are key factors in maximising the impact of change. Changing the environment is ‘worth doing’ if it is done as a design process.

These findings bring into question the bureaucratic imposition of template design buildings, such as those created in Victoria and other states of Australia for the Building the Education Revolution (BER) program (DEEWR, 2010). This approach to school facility procurement can only result in a loss of opportunity for school communities to engage in and learn from the design process.

**Architectural responses**

In the final section of this chapter, I identified ‘what’ features of the innovative learning environments in the case study schools distinguished them as ‘innovative’. The characteristics that were identified included: their design as learning landscapes; the creation of interconnected purposeful activity settings; the integration of circulation routes into learning areas; the separation of dedicated teacher spaces from learning areas; the variety of furniture items and architectural fittings included in the fit-outs of these spaces; the integration of storage solutions to support ready access to resources and tools (including ICT); the attention to acoustic properties; and the provision of blinds for the management of natural light.

In the following chapter, Chapter 6, I address how the case study school communities adapted to and made use of their innovative facilities.
Chapter 6: The influence of innovative middle years learning environments on pedagogical approaches

Introduction

Figure 80. The study's field of inquiry. Chapter focus: the influence of physical learning environments on pedagogies.

In this second of three findings and discussion chapters the following subsidiary research question is addressed: How are innovative middle years’ learning environments influencing pedagogies? The chapter is divided into three main sections: ‘cultural change and the social production of innovative learning environments’, ‘adapting to innovative learning environments’, and ‘adopting new pedagogies’. These headings emerged from my analysis of the field-data. An introduction to the theoretical frameworks that informed my analysis of the field data and supported my discussion of the findings in this chapter precedes these sections.

This chapter contains findings associated with how students and teachers used the innovative learning environments in their schools are reported and discussed. As in Chapter 5, aggregated findings from across the case study sites are presented and specific sites are referred to in order to illustrate particular phenomenon. These findings were derived primarily from the participatory action research component of the study. The data that contributed to these findings was acquired during focus group forums, interviews with teachers and students, and from my field observations. In a number of instances the findings are augmented with quotes extracted from focus group forum discussions and interviews.
The voices in this chapter are those of teachers and students. I chose to examine the use of innovative learning environments largely through their eyes, as they were the users most influenced by them.

In the following section, I outline the theoretical frameworks I used to analyse the field-data and frame discussion of the research findings. This outline includes discussion of ‘critical theory of space’ and ‘critical human geography’, ‘social meanings of space’, and ‘behaviour settings theory’. These complementary conceptual tools framed the theoretical perspective from which I explored the ways innovative learning environments influenced teachers’ and students’ geographical experiences and pedagogical approaches.

**Theoretical frameworks for analysis and discussion**

**Critical theory of space and critical human geography**

*Linking critical social theory and space*

Soja’s (1989) work revealed that space and critical social theory have not shared a long history. He suggested that only recently (from the 1980s) has the interpretive significance of space been recognised within the realms of critical social theory and given rise to the discipline of ‘critical human geography’. Soja (1989, p. 11) suggested that with the advent of critical human geography it was possible to examine historical events within the context of the construction and configuration of human geographies and the social production of space (refer to Chapter Two discussion of ‘spatiality’). To this end, he contended that critical human geography affords “a more flexible and balanced critical theory” (Soja 1989, p. 11).

It was Soja’s (1989) contention that the influence of space should be considered more rigorously when seeking understandings of the social world. He proposed that critical human geography opened up avenues for the interpretation of social histories and settings through a critical spatialization. Such an approach, he claimed, may complement the temporal or sequential time-based histories that have historically been central to critical social theory. Soja (1989, p. 25) promoted his approach to understanding ‘space-time-being’ as follows:

> Just as space, time, and matter delineate and encompass the essential qualities of the physical world, spatiality, temporality, and the social being can be seen as the abstract dimensions which together comprise all facets of human existence. … How this ontological nexus of space-time-being is conceptually specified and given particular meaning in the explanation of
concrete events and occurrences is the generative source of all social theory, critical or otherwise.

**Critical human geography and architecture**

Building on Soja’s ideas, Lees (2001) recommended a critical ethnographic approach to drawing out meaning within the context of a critical geography of architecture. She suggested that in order to gain understandings of architecture from a critical geographic perspective we must go beyond trying to understand architecture from a representational viewpoint and investigate the ways spaces are socially produced.

Specifically in the context of understanding ‘space, time, being’ in schools, Fisher (2002, p. 167) argued that:

> Critical human geography is another of the disciplines … [that is required] in order to make some theoretical sense of why schools, as political places and spaces, are seemingly unconscious of the power of space.

**Lived experience of space**

Lefebvre (1991a) argued that the production of space is never innocent. He suggested that buildings answer to particular tactics, and strategies are the space of capitalism. Hence he championed the spatial perspectives of inhabitants, or users, of spaces. It was his contention that inhabitants felt space more than thought about it and therefore they encountered a concrete or subjective view of space through their lived experience (Merrifield, 2000). Furthermore, he suggested that the lived experience of space went beyond the visual to become experienced through all the senses.

Lefebvre juxtaposed these ideas about the lived experience of space with the ways in which he suggested architects and planners often experience and encounter space. It was his contention that architects and planners often operate within, and experience space in, the abstract of the design phase. Believing that user experience of space should be more closely considered when trying to understand the significance of space, he commented that, “what we are concerned with here is not texts (blue prints) but texture” (Lefebvre, 1991b, p. 138). In supporting Lefebvre’s ideas about how to approach an understanding of architectural design, Merrifield (2000) stressed the importance of thinking about whose space we mean.
The use of critical theory of space and critical human geography in this chapter

In this chapter, I use critical human geography as an overarching perspective from which to discuss how teachers and students used and experienced space within innovative learning environments. In particular, I use Soja's (1989) perspective that critical spatialization may open up avenues for the interpretation of social histories to examine the events that occurred as teachers and students made the transition into innovative learning environments.

Power-knowledge

Foucault was described as a postmodern geographer by Soja (1989) and Philo (2000) because of the links he made between social theory and space. Foucault's exploration of power and conflict as a stabilising influence on society (Flyvbjerg, 1998) included an examination of spatial power relationships and led him to develop a theoretical construct he called ‘power-knowledge’ (Hirst, 2005). His theory incorporated a strong emphasis on social cohesion, which he suggested was first provided by discourse and then by discipline and surveillance (Joseph, 2003). In addition, Foucault acknowledged the influence of architecture on power relationships. He suggested that space, as created by the construction of walls, may determine a certain allocation of people as well as code their reciprocal relations. In qualifying these ideas, he proposed that physical space only brought about specific effects through the mediation of social relations and that architecture could not in itself resolve social problems, although it could produce positive effects “when the liberating intentions of the architect coincide with the real practice of the people in the exercise of their freedom” (Leach, 1997, p. 372). To this end, he identified architecture as a force that could arrange and amplify power through the relations that it mediated.

Foucault viewed ‘power-knowledge’ as a “distinctive feature of modern forms of control and transformation of subjects” (Hirst, 2005, p. 166) and considered schools, among other institutional sites including hospitals and insane asylums, as centres of power-knowledge. His power-knowledge construct acknowledged power as being productive of knowledge and knowledge as a resource of power. According to Hirst (2005), Foucault argued for new views of power and for new types of power; one being ‘disciplinary power’ which, rather than being negative and prohibitive, was productive and able to transform those subject to it.

Foucault believed that power-knowledge did not emanate from simple centres, but was distributed throughout social bodies via diverse relationships and through complex networks (Hirst, 2005). He also suggested that subjects were ‘constructed’ in institutions, such as schools, and became a resource of power due to the attributes and abilities that they acquired and subsequently possessed.
The use of ‘power-knowledge’ in this chapter

In this chapter, I discuss forces of social cohesion amidst a backdrop of teachers and students making the transition into innovative learning environments. Specifically, I use Foucault’s power-knowledge construct to examine the spatiality afforded by socio-spatial settings and to examine the socio-pedagogical cultures that emerged within these settings. Further to this, I use ‘power-knowledge’ to examine the influences that innovative spatial configurations had on the power relations between students and teachers and discuss issues associated with surveillance and control.

Social meanings of space

Architectural determinism

The notion that physical conditions have important social meanings has been embraced by sociologists who have identified links between social theory and space. One such relationship was described by Bailey (1975, p. 6), a social ecologist, who suggested that, “the material world is composed of physical objects and sense impressions, the existence of which is external to us but the character of which is donated by us”. He concluded that physical objects were intrinsically without meaning and we give meaning to objects according to our intentions towards them.

Placing notions such as these into the realms of architecture led to the idea that architecture may influence the way people behave. This has given rise to the construct of ‘architectural determinism’, which Leach (1997, p. 349) defined as the “capacity for architecture to influence human behaviour”. In discussing architectural determinism, Bailey (1975) refuted the idea that architecture had any direct effect on peoples’ behaviour. He argued that the influence of architecture was mediated by the social meanings that people give to their surroundings, rather than by any direct association.

The use of social meanings of space in this chapter

In this chapter, I use ideas associated with the social meanings of space and architectural determinism to discuss findings related to the meanings that teachers and students attributed to particular physical settings and discuss how these meanings influenced the ways they used particular physical settings.
**Behaviour settings theory**

Behaviour settings theory was established by Barker (1968; 1970; 1976), an ecological psychologist, and his colleagues (Barker & Gump, 1964; Gump, 1974, 1980; Schoggen, 1989) to explain the influences that ‘units of the environment’ (behaviour settings) have on human behaviour. Together, they demonstrated that recognisable units of the environment have a powerful influence over the ways people behave. They found that behaviour settings often had a stronger influence on people’s behaviour than a person’s individual inclinations. Scott (2005) explained this further. He suggested that behaviour settings coerce people to conduct themselves in certain ways as they encountered particular settings.

The component parts of a behaviour setting are not a random arrangement of independent entities. Rather, a behaviour setting is part of a nesting structure; its components have parts, such as people and furniture, and a behaviour setting (such as a classroom) that may be contained within a more comprehensive unit (such as a school) (Barker, 1970). Behaviour settings are composed of a variety of interior entities and events, including people, objects (e.g. chairs, walls, pens, paper, computers), behaviour (e.g. lecturing, listening, sitting), and other processes (e.g. air circulation, sound transfer) (Barker, 1976). These components of the environment form patterns that form the boundaries of a behaviour setting and distinguish one setting from another. Bechtel (1977, p. 33) described the boundary of a behaviour setting as, “the place where the behaviour stops”.

**Physical and social components of the environment**

Behaviour settings theory recognises physical and social components of each unit of the environment. The physical components, or milieu, are characterised by a specific set of time, place and object props, and the social components are characterised by a set of attached ‘standing patterns of behaviour’ (Barker, 1968).

Gump (1980), a colleague of Barker’s, further stratified the physical components of behaviour settings to isolate the physical milieu from the human components, thus leaving the standing patterns of behaviour (program) as the third component. By doing so, he identified three major components of behaviour settings: milieu, human components and program.

Heft concluded that although behaviour settings exist independently of individuals, they “occur naturally as a function of the collective actions of a group of individuals” (2001, p. 253). As a result, behaviour settings do not change as individuals enter or exit, as long as an adequate number of individuals remain. To this end, Barker (1970, p. 19) suggested that “it is common observation that the same people and objects are transformed into different patterns as they pass from one variety of setting to another”.

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Indeed, both the physical and social components of a behaviour setting must be present for the setting to exist (Scott, 2005). For example, a game of cricket may be recognised as a behaviour setting. For this behaviour setting to exist, a sporting field and the required equipment must be present along with the required behaviours of the players. Should any one of these components be absent then the behaviour setting would cease to function.

**Interdependence**

Interdependence may exist between behaviour settings. Behaviour settings with high levels of interdependence cannot occur simultaneously within a given community because the patterns that form the boundaries of a specified behaviour setting would break down. Furthermore, behaviour settings often act as interconnected networks, making “it possible to identify those with any specified degree of interdependence” (Schoggen, 1989, p. 35). As described by Scott (2005, p. 298), for behaviour settings to exist, they must be distinct from one another, because the “power of a behaviour setting occurs as a function of the fact that all the setting components … have a stronger degree of interdependence among themselves than they do with components outside the setting”.

**Social cues**

Behaviour settings are self-regulating and the people in a behaviour setting play dual roles. Individuals respond to cues from within the setting and also provide cues for others in the setting to follow. The number of people in a setting is a strong determinant of the likelihood that a behaviour setting will exist and subsequently influence other people who encounter the setting. Depending on the nature of the setting, the ‘inhibiting level’, or number of people in a setting for each of its ‘people positions’, is a major factor that determines how influential a behaviour setting will be on people’s behaviour. With too few people, a behaviour setting is unlikely to exert a strong influence on the behaviour of people who encounter the setting (Barker, 1976; Bechtel, 1977).

**Behaviour settings and architecture**

Bechtel (1977) and Schoggen (1989) suggested that behaviour settings are often bounded by architecture. Both contended that architectural space could play a significant role in establishing behaviour settings by determining the physical boundaries of behaviour settings. Further to this, Bechtel (1977, p. vii) suggested that behaviour settings theory could provide a platform from which to pursue social goals through architectural design.
Behaviour settings and schools

Behaviour settings theory was promoted by Gump (1974), as a useful theoretical lens through which to investigate the role of space in schools. He suggested that:

> Education is an environmental enterprise. Some have thought that it could be advanced by reliance on learning theory or principles from child development, but these thoughts arose out of social science's inability to deal with environments. As an environmental enterprise, education requires knowledge about environmental "milieu-with-program" units and concepts (Gump, 1974, p. 593).

Furthermore, Barker and Gump used behaviour settings theory to assess the influence that units of the environment had on people’s behaviour in schools. Their publication, *Big school, small school* (1964) examined the influence that behaviour settings in schools had on the participation levels of students in a range of activities. They found that smaller schools fostered greater levels of participation, while participation levels fell as schools grew larger. They attributed this finding to the fact that smaller schools provided more behaviour settings per student than larger schools.

The use of behaviour settings theory in this chapter

In this chapter, I use behaviour settings theory to discuss the influences that ‘units of the environment’ had on the behaviour of teachers and students in the case study schools. As behaviour settings theory recognises physical and social components of the environment, this theoretical lens matched well with the interests of this study—the relationships between the physical environment, pedagogy and student engagement.

Cultural change and the social production of innovative learning environments

In this section, I discuss some of the issues that confronted teachers and students as they made the transition into innovative learning environments. In doing so, I explore a number of socio-cultural issues that were found to be associated with the development of innovative learning environments. This research revealed that aligning contemporary educational practices with innovative physical environments was a difficult task for school communities – one that required substantial cultural change.

In order to develop new practices within new spaces, school communities had to critically reflect upon their past educational practices and their past and present geographical experiences. By engaging in this
reflective process, they equipped themselves with new knowledge that supported the development of contemporary curriculum, pedagogy and assessment practices and the effective use of innovative spaces.

**New architecture: whose interests were served?**

Consideration of Lefebvre’s (1991b, p. 144) conviction that “space has nothing innocent about it” raised questions for me regarding whose interests were served by the creation of new learning environments in the case study schools. As stated in the previous chapter, the primary driver for spatial change was the desire of educators to improve the overall experience of school for students. Secondary to this was the wish to improve the physical and social nature of teachers’ workplaces. In observing the case study schools attempt to meet these objectives, it became clear to me that the interests of the students, as perceived by the school leaders, were considered to be the most important. The short term interests of the teachers were not the main concern of school leaders when it came to enacting new educational visions, with the exception of Seaside SC where the wellbeing of teachers had become a pivotal issue following three years of troubled occupation in the Hub.

*The teachers*

Some teachers were excited by the prospect of moving into new environments and participating in processes of significant educational change. For these teachers, innovative learning environments represented an opportunity to implement educational practices they had sought to employ previously but which had been resisted by traditional school architecture and earlier school cultures. Indeed, the creation of new learning environments catalysed their interest in developing new professional skills and adopting contemporary approaches to teaching and learning.

Staffing adjustments at Suburban HS and Inner City PS demonstrated that retaining teachers who did not wish to alter their teaching practices was not a priority of school leaders. At both schools some members of staff were not considered suitable for teaching in new spaces. At Suburban HS, the Principal told the staff that if they considered the change agenda at the school to be at odds with their professional expectations they were welcome to leave the school and work elsewhere. At Inner City PS, the incumbent Year 5/6 teachers were either reallocated to teach other year levels or left the school. The principals at both schools justified their approach by arguing that for educational reform to be realised the ‘right people’ were needed to teach in the new learning environments.

The professional identities of many of the teachers who remained appeared to be threatened by the revised teaching roles that the schools expected them to play within new environments. Teachers who
had employed highly structured instructivist (traditional) approaches to curriculum design, pedagogy and assessment found that their professional practices were being brought into question and sometimes labelled as outdated and ineffective, a situation they found unsettling. In some situations tensions arose between the people leading change and those following or lagging behind. The substantial physical and social changes going on in the case study schools caused some teachers to appear apprehensive and stressed.

*The students*

The students at Suburban HS and Inner City PS were supported to voice their interests by both the school leaders and teachers. At Seaside SC this was not the case. At both Suburban HS and Inner City PS, students’ interests were noted and some of their ideas were integrated into the broader conceptual frameworks that informed the design of new spaces. Student voice was less influential when it came to devising the educational models that informed practice at these schools, as the models were mainly devised by the school leaders. Nevertheless, a sense of democratic inclusion of students was evident at both schools and this was representative of their whole of community approach to change.

*The Department of Education and Early Childhood Development (DEECD), design professionals and researchers*

Based on interviews with school leaders, it was clear that DEECD had a strong interest in supporting the creation of innovative learning environments – and in supporting schools to adopt more contemporary approaches to teaching and learning. The participation of some designers in focus group forums and workshops indicated that their interests lay in responding to the pedagogical requirements of their clients and in designing contemporary spaces that pushed the boundaries of conventional school architecture.

My interest as a participant researcher and that of the broader *Smart Green Schools* project was primarily associated with the collection of data. To this end, I endeavoured not to divert the design or occupation processes at the case study schools in directions that were divergent from their interests. As a participant researcher, however, I collaborated with the school communities to further their spatio-pedagogical projects.
Initial teacher unease

During the early development phases – the periods during which educational models were being devised and buildings were being designed and constructed – teachers demonstrated limited understanding of what their new learning environments would look like and how they might use them to engage students in learning. The concerns expressed by teachers during this time revealed the considerable unease and pressure they experienced in connection with imminent changes. This situation was exacerbated by the fact that many teachers found it difficult to read architectural plans – the only form in which new spatial proposals were offered. Assistant Principal, Clare (16/9/09), at Suburban HS, herself a leader of change, stated when first in a new space that, “I don't think I really understood how space could actually affect learning until I was in here”.

Initial support for teachers

In recognition of this unease, and to aid the transition of teachers into new socio-spatial contexts, school leaders contracted educational consultants to work with staff and/or sent teachers to external professional development seminars. This support was intended to assist them to develop new skills that they could apply when team-teaching large student cohorts in new spaces. In general, these sessions focussed on the logistics of constructivist pedagogies and the use of ICT.

At Suburban HS, an educational consultant was engaged two years prior to occupation of the SWiS buildings. Her ongoing role was to facilitate staff involvement in change processes. Further support for teachers was expected to come from Assistant Heads of House (one per SWiS building), who were given responsibility to help teachers develop new educational practices, including new spatial usage schemas. These measures were implemented because the school’s leaders believed that a consistent educational approach, based on shared values and beliefs, was required across the school to ensure the success the school’s spatio-pedagogical project.

At Inner City PS, the Principal expected the teachers selected to work in the Year 5/6 area to thrive in the new socio-spatial context. A charismatic leading teacher was employed to support two younger and less experienced teachers. His role was to lead the development of a contemporary learning culture that was focused on personalising learning for each student. Together, the three new teachers were given the huge task of developing curriculum, pedagogy and assessment practices in keeping with the educational philosophy that had informed the design of their new spaces. They received assistance from the school’s Principal and Assistant Principal and from the DEECD Regional Director. Furthermore, two of the
teachers were sent to a multi-day professional development seminar to learn about the integration of ICT in schools. Craig (26/8/09), one of the younger teachers at Inner City PS, reflected upon the period of early development. He suggested that much of the curriculum design comprised:

... looking at our kids, looking at the space, looking at their interests. Although it was a pain early on not having a curriculum, we grew our own … our main directive was to get flexible groupings working and to use the space to do that.

Like the school leaders at Suburban HS, the Principal and the Year 5/6 teachers at Inner City PS believed that spatial and pedagogical change needed to be understood by all members of their school community. In particular, the Principal expressed that if they were not able to communicate their rationale for spatial and pedagogical change to parents, they might enrol their children elsewhere.

Towards cultural change – the early post occupancy concerns of teachers

During post occupancy development phases – the periods following initial occupation of new learning environments – school leaders noted that many teachers initially had difficulty adapting their educational practices to suit the intentions of the new learning environments.

Observation of the first few months of occupation of the new spaces at Suburban HS suggested that some teachers were finding the transition difficult. They appeared to be confused by both the new educational model and the new spaces. They raised concerns regarding the structure of lessons, the integration of subject matter across learning domains and the development of students’ skills within integrated curriculum frameworks. Some considered these difficult to achieve without a curriculum based on siloed subjects. These concerns were entwined with concerns about how to use their new learning environments.

Prior to the Hub’s refurbishment at Seaside SC, there were signs of misalignment between educational practices and the design of the learning environment—even after more than two years of occupation. Although the teachers described their desired pedagogical approaches as being informed by inquiry-based learning, project-based learning, authentic tasks, authentic audiences, independent/personalised learning, student-based research, problem solving, community connections and team teaching, none of these approaches were observed. Instead, pedagogical practices were characterised by direct instruction, teacher led discussion, and teacher prescribed activities. Furthermore, little collaborative team teaching occurred. During the majority of lessons the teachers worked independently with ‘their’ groups of students within the space.
The pre-refurbishment design of the Hub contributed significantly to teachers altering their pedagogical approaches. Later in this chapter I return to discuss how the original design of the Hub negatively influenced teaching and learning activities.

At Inner City PS, a productive professional conversation between the Year 5/6 teachers was quickly established. Effective collaboration between these teachers resulted in the rapid development of a new learning culture. To this end, one teacher, Cathy (26/5/09), commented that although she had been nervous about the transition into the new spaces, she now preferred the new environment because she and her colleagues worked well as a cohesive team. She expressed concern, however, about possibly having to work in the future with teachers she may not get along with.

_Engaging more deeply with educational theory_

School leaders across the case study schools believed that further discussion of educational theory amongst their staff was required in order to establish contemporary learning cultures that could be sustained over the longer term.

For example, the school leaders at Suburban HS believed that their school’s vision and values remained poorly understood by teachers – even following a number of professional development sessions with a leading educational consultant. They suggested that teachers needed to form better understandings of the theoretical perspectives that had informed the schools’ spatio-pedagogical project. To assist teachers to comprehend the emerging educational paradigm, allowing time for critical reflection at many points along the change journey was identified as important. As change at Suburban HS was being attempted on a massive scale, the school leaders were taking a long-term view regarding the establishment of a new socio-spatial context for learning and recognised that significant teacher professional learning was required in order to establish a contemporary, and sustainable, educational model.

To support ongoing staff professional learning, the school leaders at Suburban HS recognised that they needed to provide teachers with more time to plan and discuss their teaching practices with colleagues (as teacher teams). In addition, they provided teachers with planning templates that highlighted issues associated with ‘principles of teaching and learning’, ‘phases of learning’, ‘student and teacher groupings’, and ‘learning spaces/resources’.

Even with this assistance some teachers continued to disengage from the change process at Suburban HS. During one professional learning seminar, a teacher likened the new educational model and the new learning environments to other new technologies and attributed the disengagement of some teachers to
them not being interested in ‘these particular technologies’. He suggested that the values and beliefs of individual teachers were hard to shift and that some teachers simply did not wish to partake in change.

Nevertheless, many teachers at Suburban HS were willing to change. The 60 teachers who had volunteered to participate in meetings associated with the development of the new education model and new spaces made the transition into the new socio-spatial context for learning with relative ease. I attributed this ease of transition to their; interest in the school’s spatio-pedagogical project, greater familiarity with the change agenda, positive experiences of collegiality, and better understandings of the learning theories that had informed changes at the school.

Developing communities of practice

Although some teachers became disengaged with the change process at Suburban HS, others became highly engaged in the new socio-spatial context and made substantial contributions to the ongoing development of the new educational paradigm. To support teacher engagement, the school’s leaders remained open to suggestions from staff regarding the development of improved practices. Their openness to suggestions was illustrated by one instance in which a first year teacher suggested that Gantt charts (Clark, 1938) be used to plan and monitor the progress of units of study and students research projects. This suggestion was taken up and networked across the school. The incorporation of suggestions such as this into practices at Suburban HS indicated to me that a democratic management structure was being established, and that the school was developing a ‘community of practice’ (Lave & Wenger, 1991; Wenger, 1998) which exhibited characteristics of mutual engagement, joint enterprise, and shared repertoire (Laksov, Mann & Dahlgren, 2008).

Power-knowledge and the development and networking of new practices

The ways school communities participated in the development of new socio-pedagogical cultures was suggestive of Foucault’s work on power-knowledge. While progress was characterised by “continual strategic interaction and struggle” (Joseph, 2003, p. 200), the transformation of these initially fractured communities into more socially cohesive units appeared to be facilitated first by discourse, then by discipline and surveillance (Joseph, 2003) – discourse guided reform, expectations associated with new curriculum, pedagogy and assessment practices acted as disciplinary measures, and surveillance was supported by team teaching arrangements. In this way, power-knowledge acted not only as a negative force that weighed heavily on teachers (and others), but also produced discourse that enabled them to form new knowledge and develop new practices. Furthermore, practice-related change did not only emanate from simple centres, such as school leaders or educational consultants. Rather, new knowledge and practices appeared to be developed and distributed throughout these school communities via diverse relationships and complex networks (Hirst, 2005).
Adapting to innovative learning environments

In this section, I examine the extent to which teachers and students adapted to innovative learning environments. I describe the events that unfolded in the case study schools through the lenses of critical theory of space and critical human geography.

“Where is the front”? Teachers’ early geographic experiences in innovative learning environments

Initial geographic bewilderment

The geographical experiences afforded by the innovative learning environments in the case study schools were vastly different from those afforded by traditional classrooms. For many teachers, the settings that confronted them were not familiar. Although lengthy, the following quote from Assistant Principal, Clare (16/9/09), at Suburban HS, illustrates clearly the geographical bewilderment some teachers experienced when they first encountered the innovative learning environments in their schools. To a greater or lesser extent, this statement reflects a number of the situations I observed.

One of my highlights is that on the first day, the first day that we were in here, I went to get the kids from outside and I brought them in and the first class was the science class. So I brought them in and I walked them in and I said that this is your space, you know, and they all walked in, and we didn't have any chairs, which was a bit of a challenge [soon to be rectified], and it was funny, and the kids were all standing around thinking what do we do now, and the teacher said to me, “Where is the front?” and I said, “What”, and she said, “Where is the front of the room, where do I stand?”, and I said, “Well, wherever you want to stand”, and she said, “No, no, no, to teach, where do you want me to stand?”, and I said, “Well, that depends on what you are doing”, and she's said, “I don't understand what you mean”. So I said, “Well, if you want to use the whiteboard you stand over there, and if you are going to do a demonstration over there”. But she said, “No, no, no, when I am teaching, where do you want me to stand?” And then at that moment I thought oh! And the understanding amongst the people who were a part of the planning and the understanding in the masses probably has a bit of a gap between them, and that for many teachers when they first moved in here there was much uncertainty. It was an important question, “Where is the teacher's desk, and where do you want me to stand?”

No longer were boards located at the front of the class and desks set up in rows. In fact, locating the ‘front’ in many settings was a difficult task. Instead, collaborative table settings and soft seating areas had been established to cater for formal and informal group discussions, and ubiquitous computer access had been provided for students in many areas. These physical changes meant that teachers and students did not initially recognise behaviour settings (Barker, 1968) in these spaces.
Not only were the physical components, or milieu, different from traditional classrooms, but the social components, including the human components and the program (standing patterns of behaviour) (Gump, 1980), had changed. With two or three times the numbers of students in each cohort (50 or 75 depending on the school) and the expectation that three or four teachers would teach collaboratively, the social dynamics in these new learning environments were fundamentally different from those the teachers had been accustomed to in traditional classrooms. Further to this, the program components associated with traditional classrooms were no longer present. As a result, teachers and students were uncertain about how to behave in these new settings. In particular, many teachers were confused about what roles they should play when team-teaching—especially at Suburban HS and Seaside SC.

*Developing new behaviour settings*

Developing new behaviour settings in innovative learning environments presented a significant challenge for many teachers because they were uncertain how new behaviour settings should function. When teachers realised that the standing patterns of behaviour (program) they had been familiar with in traditional classrooms no longer applied, some became fearful of their new environments.

School leaders attributed the early difficulties that many teachers had using innovative learning environments to their uncertainty regarding their use, rather than there being any problems with the designs of the spaces themselves. They suggested that the fear some teachers had of the spaces was associated with them being comfortable with their ‘old mental models’ of teaching and learning, but challenged by the new educational models they were expected to employ. More specifically, I attributed this uncertainty to their limited understandings of the educational theories that had informed the spatio-pedagogical projects in each school, their lack of experience with constructivist pedagogies, and lack of adequate professional development opportunities. Furthermore, teachers lacked environmental competence – the ability to use the physical environment to meet desired goals (Steel, 1980; Lackney, 2008).

*Teachers’ initial lack of environmental competence*

My observations revealed that many teachers lacked environmental competence when first in the new learning environments. For example, one teacher at Suburban HS demonstrated a lack of environmental competence when for 10 minutes he repeatedly asked a sub-cohort of 17 students to listen to his instructions while they were seated at computers in the central common of the SWiS buildings’ first floor. When the students continued to be distracted by the computers in front of them, he became sufficiently frustrated to resort to threatening them with lunchtime detentions. All the while, a small group discussion area sat vacant immediately adjacent to the computer area. Rather than use this setting that afforded
close proximity and face-to-face contact amongst members of the group, he persisted with trying to communicate with the students while they were seated at the computers. This setting was not conducive to direct instruction because the students sat facing their computers and face-to-face contact was restricted.

The wet area, or ‘making and doing’ space, at Suburban HS also proved to be a learning environment that was unfamiliar to teachers – many raised concerns regarding its usefulness. Initially, many teachers struggled to use this environment effectively. During the first few months of occupation, teachers identified the space as unsuitable for teacher-led instruction or large group discussions, due to its hard surfaces and poor acoustics. However, this setting was intended to facilitate students moving from other areas to work on art and craft activities, as required. The concerns raised by teachers about this space may have had more to do with them being unfamiliar with the types of learning opportunities afforded by it, rather than any problems associated with the design of the space itself.

Certainly many teachers were unprepared and therefore not initially empowered when it came to appropriating unfamiliar settings or manipulating settings to suit their pedagogical objectives. The school leaders acknowledged that many teachers were not making use of moveable furniture to create settings for specific pedagogical encounters.

At Inner City PS, one teacher struggled to comprehend how the schools' library might be furnished to operate as a collaborative learning environment during the period when the Year 5/6 cohort of 69 students occupied this space while their spaces were being refurbished. The teacher appeared to approach the task of rearranging the existing chairs and tables without any conceptual framework. Rather, he used an experimental approach that involved moving the furniture around to test various configurations. Ultimately, he set up the library so that each mentor group of 22-25 students could operate as a distinct entity, rather than create a series of settings that could be used by the entire cohort of 69 students. He did, however, create a space for the whole student cohort to sit together on the floor.

_Developing new mental models: aligning pedagogy and space_

In relation to issues associated with teachers making the transition into innovative learning environments, Assistant Principal, Clare (16/9/09), at Suburban HS commented about teacher’s reactions to the new spaces:

I think teaching in a box for 20 years, which is what I have done … can be a confining thing. When we came into this space [the SWiS building], the confines were still there. It was funny, because the confines were not there physically … We talked about letting go of some of the ways we used to do things, the ways we used to plan, the ways we used to think about and see learning. Letting go
of some of those actually allowed us to embrace the possibilities of the space …
I think the whole building has challenged me … when we walked in here I
thought ‘Goodness me what are we going to do’? I was excited by it, and it was
great because it is what we wanted, but I thought, ‘But how is this going to
work’?

Across the case study schools, teachers’ ‘mental models’ progressively changed as they spent more time
in innovative learning environments. As time elapsed, teachers let go of past practices and began to
embrace the affordances (Gibson, 1977) of their new learning environments. For many teachers, these
changes meant that they had to alter the ways they practiced their profession. Through this process it
was evident that innovative learning environments were slowly encouraging teachers to adopt new
practices.

Although teacher practices may not have been well refined during early occupation, school leaders
maintained that the concepts that had informed the designs of their new learning environments (including
the refurbishment of the Hub at Seaside SC) were sound and that changes to teacher practice would
ultimately lead to an alignment of pedagogy and space, and this alignment would support improved
student engagement. This perspective was countered by some teachers who believed that the new
spaces were not ideal and should be altered to alleviate the difficulties that they had working in them.

Team-teaching: adapting to new organisational structures

Collaborative planning

Despite it being advocated in the literature for almost 50 years, the first time the majority of teachers in
this study experienced team-teaching was on their first day in their schools’ new learning environment.
Prior to this, these teachers had planned their lessons independently and taught in isolation. Upon
occupation of new spaces, it quickly became apparent that collaborative planning and dialogue between
teachers was essential if team teaching approaches were to be effective. A number of teachers
commented that they needed to be very well prepared when team-teaching because working with
colleagues did not allow them to make significant last minute planning decisions.

A positive outcome of the need for rigorous collaborative planning was that teachers interacted more on a
professional level; they shared expertise and supported each other to a greater extent than they had in
the past. Allan (26/8/09), at Inner City PS, commented that:

Opening the student learning space has meant that we are interacting,
planning, refining, philosophising, you know, it is almost meta-cognitive. It is
constant. It is just this constant professional conversation that we are having
and I think that part of the reason that we all get exhausted by the end of the
week is because we are so stimulated by what we are doing. I've been teaching for over 20 years … but I'm finding it the best teaching that I have done.

Many teachers and consequently students benefitted from the collaboration that came with team teaching. Teachers profited through challenging each others’ practices and sharing knowledge about curriculum, pedagogy and assessment. To this end, Allan (26/8/09), at Inner City PS, suggested that teaching in isolation had not brought with it sufficient challenges to shift teachers’ practice, but working collaboratively with colleagues on a consistent basis was a catalyst for change and improvement.

*Collaborative planning and spatial arrangements*

Professional discourse was supported by the co-location of teacher-teams in dedicated staff study areas. Teachers situated close to one another found it easier to meet and plan collaboratively. At Inner City PS, the three Year 5/6 teachers shared a staff study area that was situated immediately adjacent to the learning environment – an ideal situation. At Suburban HS, teacher-teams were allocated to sit next to one another, where possible, within a house-based study area. At Seaside SC, the teachers who taught in the Hub were not situated together in a common staff study. This made collaboration more difficult for these teachers due to reduced opportunity for informal discussion.

My observations revealed that the co-location of staff in common study areas supported powerful informal professional learning and the networking of new practices. Staff identified informal learning as good for their professional development and a number commented that they enjoyed working closely with colleagues. Collaboration between teachers was also supported by access to the learning environments in which they taught. Teachers found it helpful to conduct some of their planning meetings in learning environments so that they could visualise how various settings might be used for pedagogical activities.

*Time for collaborative planning and professional learning*

Even with the co-location of staff in dedicated areas, teachers identified the lack of time as a major factor restricting the development of new teaching models and practices. They complained of being burdened with increased workloads due to the significant time required to communicate with colleagues to plan team-teaching strategies. These complaints were rejected by the Principal at Suburban HS (28/1/10). In his opinion, teachers only felt that there was more work because work practices had changed, rather than because there was actually more work to do. He suggested that teachers were now working at a professional level and doing what was expected of them. He thought that perhaps teachers were working harder in their planning, but as there were fewer discipline issues, less of their time was being taken up with student management issues. He recognised that collaborative planning may be time consuming but suggested that the resultant learning experience for students was better.
While some teachers were happy to commit to working longer hours at school, others were less inclined to alter their work patterns. At Suburban HS, some teachers complained that working in teams had caused them added stress and suggested that a number of teachers had found it difficult to adjust to team-teaching approaches. Some of the issues they identified as having caused problems included: difficulty finding time for team planning, difficulty establishing who should fulfil particular roles during lessons, differences of opinion regarding how much control teachers should have over students during lessons, and clashes resulting from personality differences. These teachers believed they needed further formal professional development if they were to make a successful transition into their innovative learning environments. After only a few months in the new environments, one of the teachers who contributed to these comments left the school to teach elsewhere.

**Students’ geographic experiences in innovative learning environments**

*Freedom to move around*

Students experienced a greater sense of geographic freedom within the innovative learning environments in the case study schools than they had previously in traditional classrooms. When not receiving teacher instruction, the openness of these environments facilitated student movement and the diversity of settings on offer provided students with choices about where and how they might engage in learning activities. The spaces that students appropriated were often those not furnished with tables and chairs. Frequently, students chose to sit or lie on the floor, either by themselves or in small groups, sometimes with their backs against the wall. Commonly, students sat on steps, tiers or raised platforms, or arranged ottomans to work in small groups. Of course, students also sat at chairs and tables, including at dedicated computer desks.

Many comments made by students indicated that they enjoyed their new geographic freedom and the learning experiences that their new environments enabled. I have included a sample of these comments below:

> Here you can learn while having the freedom to move around (Steff, Suburban HS student, 29/10/09).

> I didn’t like it when things were all enclosed and there was a room over there and another room over there … this is, overall, a lot better … it’s good because we have a new system … all of the classes are actually all together now. We have reading groups mixed with other classes, and maths groups mixed with other classes - all of the subjects except for some individual writing tasks from our teachers … so you get to be with your friends and you get to become friends with other people from other classes (Rachel, Inner City PS student, 17/11/09).
I like how the three teachers work together. They are not always telling us that you have to work here or you have to work there, which is really good. So you don’t have a certain spot where you have to sit, which allows you to sit anywhere—which is really good because we used to only be able to work in a certain space (Rowan, Inner City PS student, 15/9/09).

It [the Hub] gives you a lot of space to move around … people like moving around … it kind of stimulates you. It’s just a different way of learning (Kate, Seaside SC student, 6/11/09).

Access to a variety of learning settings/spaces

Access to a variety of settings within open or interconnected learning settings allowed students to participate in activities that may not have been supported by traditional classrooms. For example, students were able to spread sizeable materials, such as newspapers, out on the floor, or relocate to make use of larger tables. The inclusion of readily accessible wet areas at Suburban HS and the Hub at Seaside SC (following its refurbishment) also allowed students to access art and craft resources. The advantage of having access to a range of learning settings was noted by students. They suggested that access to wet areas, ICT and a range of social settings aided their learning. When interviewed, students made the following comments:

It is easy for us to access things like computers, technology and making things, like for models and posters … we can stay in one area and do one thing, while others work [elsewhere] on another thing, and we don’t get mixed up (Daniel, Suburban HS student, 29/10/09).

Here you have ‘air to breathe’ … being able to move around and do more stuff … There are spaces for multimedia, there are open spaces for physical activity, and there are the more traditional spaces … there is so much you can do compared with our old buildings (Lakshmi, Suburban HS student, 29/10/09).

You don’t really have to walk far. Everything is so near to you. We have everything we need … lockers, and computers most importantly … in this building everywhere you look there is a computer … you can just walk over and work on it (Shanti, Suburban HS student, 29/10/09).

It [our learning environment] is really spaced out. There are lots of personal activities that you want. But if you want to work with friends there is lots of room for that … I usually use the [western room] because not many people go in there and I like to be personal … because it is usually really quiet, it is easy to concentrate in there (Mary, Inner City PS student, 17/11/09).
Settling into innovative learning environments

In general, students appeared to settle into the new learning environments at both Inner City PS and Suburban HS in a matter of weeks. Evidence for this was seen in the ways they quickly became accustomed to appropriating spaces as they required them.

At Inner City PS, student appropriation of space was encouraged by teachers during non-instructional periods – a privilege that was granted as long as students remained engaged in their work and demonstrated responsible decision making regarding their choice of location. Once provided with instructions about an activity, students were able to move around to gather materials and find suitable spaces to work. For example, I observed students flow throughout the Year 5/6 learning environment on a number of occasions at the commencement of ‘quiet reading time’ to collect their books and find a spot to read. As students were able to choose where they sat, this resulted in a reasonably even distribution of students across the learning settings.

For the most part, the geographical behaviours of the students at Suburban HS were similar to those of the students at Inner City PS: students were able to move about within designated zones when not receiving instructions from teachers.

In the Hub at Seaside SC, students’ spatial usage schemas were significantly different pre- and post-refurbishment. As described in Chapter 4, the Hub as originally designed was a large open space, equivalent in size to four classrooms (including what might have been a central corridor). In this condition, the Hub was a homogeneous environment with little spatial differentiation, apart from that provided by two strips of heavy stone-topped desks which ran from the east door to the west door. These desks created a ‘corridor’ effect which was problematic. Teachers and students from other classes read this space as a thoroughfare and regularly walked straight through it while lessons were being conducted. This caused both teachers and students in the Hub to become distracted from what they were doing.

In its original incarnation, teachers described the Hub as “like a gym” (Margaret, 14/5/09), and as an “open space that made the kids want to run around” (Greg, 14/5/09). Some teachers suggested that it wasn’t simply the overall size of the space that made it problematic. They believed that limited access to resources and the lack of well defined settings within the space contributed to students finding it difficult to develop an affinity for the learning environment. One teacher, Gina (14/5/09), contrasted the learning environment in the Hub with that of the schools’ library. She suggested that although the library was of a similar size to the Hub, students behaved “just fine” in the library due to the stimulus that a variety of settings and a range of resources, including ICT, provided.
Effectively, students appeared to be at a loss regarding how to use the Hub in the pursuit of learning prior to its refurbishment. The fact that the Hub was the only space of its type in the school didn’t appear to help this situation. When interviewed about the Hub, one student made the following comment, which indicated that the socio-spatial context in the Hub was somewhat bewildering to her and not to her liking. This was representative of the beliefs of other students prior to the refurbishment of the Hub:

I don’t like the whole set up, basically. It is too broad and too much to take in. You need a focus point in a class. In every class you need a focus point. Somewhere you know where everything will happen: where a teacher stands or where a teachers’ desk is or whatever. The teacher doesn’t even have a desk here. The teacher is just like a floater. It just floats around and sits at whatever table ... I hate when you need help and you look around and the teacher is in random spots. I like when they go back to their spot (Tami, Seaside SC student, 6/11/09).

This comment suggested that students found the Hub geographically, and pedagogically, bewildering. This placed a great onus on teachers to try to control students’ behaviour and keep them on task. During my observational visits to the Hub, I regularly witnessed teachers ask ‘their’ 25 or so students to sit at chairs and tables in one area and subsequently walk laps around them as if attempting to enclose the area. In this way, sections of the Hub were socially indistinguishable from traditional classrooms: rather than the four walls being formed of timber and plasterboard, they were being socially produced by the teachers. Such behaviour limited the geographic freedom of students, and although aware of this, teachers considered this better than having them ‘run riot’.

Following the refurbishment of the Hub, teachers reported that students’ geographical experiences had been liberated and suggested that students had responded well to the range of settings that had been created. Specifically, they identified that students had recognised the environmental cues (Barker, 1968) associated with particular settings and had generally behaved in ways that were in keeping with the settings they occupied. My observations confirmed this. For example, project groups of four students sat at tables and chairs in the research and discussion area while planning how to undertake a particular task before relocating to the wet area to engage in construction activities. In this way, students appropriated settings as they needed them, rearranged furniture items to meet their needs and relocated between settings to pursue different aspects of collaborative projects.

*Student movement and disturbance*

Students’ learning activities were rarely interrupted by the respectful movement of other students in these new spaces. It appeared that these open and interconnected learning environments (including the Hub at Seaside SC post-refurbishment) reduced the sense of intrusion that people experienced as others pursued learning activities around them. This lack of disruption appeared to be associated with the relatively constant movement that occupants witnessed and the passive transfer of some noise. As the
Principal at Inner City PS had envisaged, students and teachers often appeared not to notice when people entered these environments or relocated within them.

*Students’ choice of space and associated influences on participation in learning activities*

The places students chose to locate themselves had implications for their learning in the eyes of some teachers. For example, Allan (26/8/09), a teacher at Inner City PS, raised concerns about the quality of work that students produced when seated in some locations. He expressed concern about students’ handwriting and the conceptual quality of their work when they chose to locate themselves in ‘inappropriate’ physical settings. He said:

> There were issues with presentation—and I never thought that I would be a teacher who would be stressed about presentation ... You can tell when you’re reading a students’ work that, if the handwriting is all over the place, often they have chosen an inappropriate place to sit. They are sitting, they’ve been distracted, they are trying to write on their knees. The work, the output is not there. The thinking is not there. The structure is not there. The quality of the work is not there. So, it's that balance of saying, “Okay choose an appropriate place to work. Balance that with creativity and you be responsible for what you are doing”.

To encourage the ‘appropriate’ use of space by students, the teachers at Inner City PS integrated discussions about the use of space into their daily practices. As the result of this dialogue, students tended to make better geographic choices. Craig (26/9/09), another of the teachers at Inner City PS, commented:

> It's a learning process for them, but I see that towards the end of term they are using it [the learning environment] far more wisely, because we are coaching them more. [We often say to them], “Choose where you work really carefully. Think about what you're doing and choose where you work”.

At Suburban HS, students were asked to plan how, when and where they would work on projects. To facilitate this planning, the students were provided with Gantt charts (Clark, 1938) and asked to discuss them with teachers. This process was intended to support students’ self-direction and assist them to make informed decisions about which settings and resources they would use to complete their projects. Such facilitated metacognition regarding the use of space appeared to play an important role in supporting the development of students’ environmental competencies and appeared to empower them as self-directed learners.

The dialogue that was observed between teachers and students at Inner City PS and Suburban HS regarding the use of space may have been illustrative of a broader trend towards increasing the involvement of students in school development (Prout & Hallett, 2003; Lodge, 2005). To this end, Prout
and Hallett (2003) reported that a trend towards promoting the increased involvement of students in school life was observed in the social policies of more developed countries. In addition, Lodge (2005) found that dialogue between teachers and students aided the development of whole of community approaches to enquiries into learning practices. Furthermore, she made connections between the involvement of students in school development and the concept of democratic schooling. Following this argument, there appears to be clear links to be made between the dialogic practices at Inner City PS and Suburban HS and the development of a ‘critical pedagogy of space’ in these schools – as discussed in Chapter Five.

_Student physical and mental comfort_

In addition to the learning opportunities afforded by new environments, the overall comfort that students experienced in these spaces was important to them. During interviews, students made references to features associated with thermal comfort, air quality and light levels, and described these environmental factors as influencing their like or dislike of particular environments or settings. In addition, they suggested that the materials with which they came into contact were important. They particularly did not like sitting on hard surfaces for long periods of time. The following are examples of students’ comments:

- It’s good because the old classrooms were smaller and darker. Like, now there is white paint on the walls and it is bright and the windows make light to come in. So I think it is brighter. It’s a happier place to go to school (Timothy, Inner City PS student, 15/12/09).

- The lessons are being made easier. It is easy to study in here. It is more comfortable. In the old buildings we had lots of troubles with them. We had to move all the tables and chairs and it was very annoying (Lakshmi, Suburban HS student, 29/10/09).

- I don’t really like them (the tablet chairs – with fold down work surface) because I’m left handed … I feel like there is not enough space. It’s a bit hard to work on them. I feel uncomfortable working on them (Rowan, Inner City PS student, 15/12/09).

- I once had to sit at one of them (a tablet chair) and I got so annoyed at it … it affects what you do … having more tables would be better than having the tablet chairs (Lena, Inner City PS student, 17/11/09).

- I think they (the ottomans) are really good … they are comfortable when you are reading … we also move them around into different shapes so we can talk to each other … when you move them into a circle it is easier to listen to people if you are in a small little group (Mary, Inner City PS student, 17/11/09).
**Students’ preferred settings**

Many students identified intimate settings as their favoured locations to engage in learning. This information correlated well with my observations of their use of space. I observed that although students made use of all of the areas that were made available to them, they frequently congregated in small groups (2-4 students) in more isolated or intimate locations, as opposed to situating themselves in the middle of large open spaces. These observations suggested that students felt psychologically more comfortable in smaller spaces. To this end, some students expressed unease about being situated in large open spaces. Cathy (26/5/09), one of the teachers at Inner City PS, reported that a student had suggested to her that she really didn’t like being in the middle of open spaces and suffered from “the opposite of claustrophobia”.

Some of the more intimate spaces that students particularly liked included the hallway area at Inner City PS and the mostly enclosed ‘Community of Inquiry’ area at Suburban HS. Students suggested that these settings were good for working in small groups or individually and were generally quiet and suited to thinking. Indeed, the ‘Community of Inquiry’ space was described as a ‘student magnet’ and as a revelation in terms of adolescent learning by a group of Suburban HS teachers – a place where teachers often sat on the floor or tiered seats with students to support them in their learning. Further to this, one of the teachers at Suburban HS, Fiona (28/1/10), suggested that the students liked the ‘Community of Inquiry’ space so much that they “want to work in that space and stay there out of school hours ... We haven’t seen that before”.

Regarding the value of intimate spaces, students at Suburban HS identified that it was important during group discussions to see everyone’s face. For this to occur, they suggested that groups should to be restricted to about 15 students and take place in intimate settings, such as the ‘Community of Inquiry’ space and the ‘Relaxing and Reading’ areas.

Finally, another space preferred by students at Inner City PS was the stage. With its opportunities for multiple use, its raised position and its northern orientation providing good natural light, many students identified this as their favourite setting:

- I like the stage area because it has lots of space and you can chill out a bit … it is comfortable … and it is nice to be higher up. You are not usually above ground level at school (Timothy, Inner City PS student, 15/12/09).

- One thing I feel really strongly about is the stage. I really like it. It is really useful for unit meetings when you have to get together all of the classes, and everyone, because there is lots of space to fit everyone. And it is also good because the teachers can stand up there and see everyone (Lena, Inner City PS student, 17/11/09).
**Students’ less-preferred settings**

The areas that drew the most complaints from students were the locker areas. At Inner City PS, students were particularly adamant that their lockers were too small and located too close together.

> They [the lockers] are not very big … and they are not very private. They are just open … A lot of things go missing. Things just roll onto the ground … [the bag space on top of the lockers] is annoying, really annoying. It needs lots of improvement (Rachel, Inner City PS student, 17/11/09).

> Something I really don’t like is the lockers …The thing is that with the hall at recess, when everyone rushes out to get their food and get outside, it can get really squashed. Especially with things falling out of the lockers, you can get easily tripped over and be pushed around and that. I really don’t like that … it needs quite a bit of improvement … people can get really, really, really grumpy because they get pushed around so much (Lena, Inner City PS student, 17/11/09).

‘Battling’ other students to gain access to lockers appeared not only to be potentially dangerous but to unsettle some students. This sometimes appeared to affect their ability to engage in subsequent learning activities.

In contrast to some of their complaints, the positioning of lockers within the new learning environments at both Suburban HS and Inner City PS was identified by students as advantageous, as it enabled them to access their lockers during lessons.

**Social meanings attributed to spaces and objects**

The social meanings (Bailey, 1975) that teachers attributed to spaces – and even to specific objects – were found to influence the ways learning environments were used. For example, at Inner City PS the space fitted with an interactive whiteboard (IWB) became known as a quiet computer use area when the IWB was not being used by teachers. The early intentions shown towards the IWB by teachers suggested that this was a teacher tool, rather than a technology that might be used by students to support student-directed activities. By granting such meaning to the IWB, opportunities for active student collaboration using this technology were overlooked. This example illustrated how the social meanings attributed to spaces may influence the behaviour of both teachers and students via an indirect form of architectural determinism (Bailey 1975).

The meanings attributed to particular spaces also played a positive role in the social production of new learning environments. By attributing particular spaces with certain meanings, spaces were transformed from being physical entities to become settings that communicated pedagogical intent.
Spatial ownership, surveillance and social control

Ownership of space

Spatial ownership influenced the ways teachers and students used space – a finding that concurred with Higgins et al.’s (2005, p. 7) conclusion that “ownership of space and equipment by both teachers and students is important”. Across the case study schools, students and teachers expressed ownership over their learning environments through their movement of furniture and their appropriation of spatial settings.

In keeping with the Foucauldian issues of ‘social control’ and ‘surveillance’ (Hirst, 2005; Joseph, 2003; Leach, 1997; Philo, 2000), my research revealed that teachers’ attitudes towards student-directed learning influenced the ability of students to express spatial ownership. For some teachers, letting go of the social control they had within traditional classrooms was difficult. In situations where teachers tried to maintain tight control over the ways students participated in learning activities, students demonstrated fewer expressions of spatial ownership. On the other hand, where teachers granted their students the liberty to engage in self-directed activities, students demonstrated more expressions of spatial ownership. I observed that as teachers spent more time within innovative learning environments many adjusted their approaches to controlling students’ geographies. As time passed, many realised that the social structures that had been developed within traditional classrooms were no longer tenable and that new social dynamics and power structures were required within innovative environments.

Releasing control over students’ geographies

The release of control over students’ geographic experiences followed a process in which teachers re-conceptualised how and when learning occurred. Subsequently, this led teachers to gradually adopt new pedagogies that focused more heavily on the ‘processes’ of learning rather than on the ‘products’ of learning (such as completed assessment tasks). As teachers’ perceptions changed, they began to see the potential benefits that greater geographic freedom could bring to the learning situation. In particular, they recognised that allowing students to decide where, and often with whom, they engaged in learning led to students taking greater responsibility for their own learning and helped them to develop skills needed for life-long learning. Assistant Principal, Clare, at Suburban HS (16/9/09) described her journey from teaching with a highly structured and controlled approach to being a leader of constructivist learning experiences:

So when I’m talking about control, I think I’m talking about being able to guide what is happening in the learning environment. And I think for me what has been happening is that my understanding of learning has changed ... even my understanding of assessment has changed, because for me assessment was
looking at a finished product and then applying a set of standards, or rubric, and then giving the students feedback and having reflection on that—which is a valuable process.

One of the things that I have learnt is that observation is a really incredibly powerful form of assessment; and observation throughout the process. And the students can learn - I mean, what they are doing at the moment is an amazing thing. Students can learn every day in different ways and it doesn't have to have a piece of work at the end of it. It [the journey] can be just as powerful a learning experience.

The release of teacher control over students’ geographies provided further evidence that the new architecture and the educational theory that had informed the spatio-pedagogical projects in the case study schools was challenging teachers to re-evaluate their roles and their practices.

**New pedagogical frameworks – indirect control measures**

As time passed, teachers developed and refined new pedagogical frameworks/approaches in response to new socio-spatial contexts. These frameworks subsequently acted as subtle and indirect control measures. As much of the innovative architecture in the case study schools did not support teachers standing over the students to ensure that they participated in learning activities, these new frameworks were developed to guide students in their learning.

Many teachers began to distribute booklets that contained project requirements and assessment rubrics to students. These texts communicated to students what was expected of them over the longer term, supported them to pursue learning across a range of physical settings, and enabled them to discuss their learning with other students and multiple teachers. In addition, teachers started using mobile whiteboards and other visual cues to remind students of the expectations that had been set. Later in this chapter, I elaborate on the development of these new pedagogical frameworks (see ‘Adopting new pedagogies’).

**Surveillance – power with, not over students**

Some teachers expressed disappointment that some students took advantage of their geographic freedom to avoid participating in activities they did not like, such as teacher-led instructional activities. As a result, teachers were required to maintain surveillance over students’ actions and occasionally discipline students who did not meet the expected norms of behaviour. In keeping with Foucault’s power-knowledge construct, it appeared that teachers engaged in surveillance and disciplinary actions for purposes of supporting, rather than controlling, student participation in learning. As suggested by Foucault, surveillance and discipline may have a positive benefit for those who are subject to it because of the attributes and abilities that they ultimately acquire (Hirst, 2005). The Principal at Suburban HS (28/1/10) suggested that the new learning environments at his school required "power with, rather than
over, students”, and that showing students respect and engaging them in learning was the key to achieving the new education model and socio-spatial context at his school.

The ubiquitous surveillance of students was supported by team-teaching arrangements. With three or four teachers on hand to observe what students were doing, students were rarely unsupervised. Students were also rarely overtly disruptive, and on the occasions when they were disruptive, teachers were usually able to address these situations without interfering significantly with the learning activities of other students. When required, teachers were able to remove students from troubled situations and relocate them to other areas of the same, large scale, learning environments.

*Social cohesion and the democratisation of the learning environment*

Social cohesion appeared to be generated when teachers and students engaged in ongoing discourse regarding the expected norms of behaviour that were associated with the use of space, and subsequently when both teachers and students engaged in acts of discipline and surveillance. This was another example of how power-knowledge did not emanate from simple centres (the teachers in this case), but was networked throughout these social bodies via diverse relationships (Hirst, 2005). Such networking across these learning communities aided the development of new socio-pedagogical cultures that exhibited democratic qualities. In turn, this democratisation appeared to support student participation in constructivist learning activities.

*Shared ownership of space*

The degree to which school communities shared ownership of space was a significant factor in the development of new pedagogical approaches. In situations where ownership of space was not shared, the development of new pedagogies was hindered. For example, some teachers at Suburban HS became frustrated when their colleagues tried to maintain high levels of control over students’ behaviours and geographies. These teachers suggested that maintaining tight control over students’ actions reduced their ability to engage in the constructivist learning that involved high order thinking - especially associated with the skills of analysis, application and evaluation (Bloom et al, 1956). These teachers did not believe that a controlled approach was aligned with the new educational model that was being implemented at the school. They identified a mismatch between the schools’ learning environments and the traditional pedagogies that some of their colleagues continued to employ.
**Time and ownership**

Time was found to be a major factor influencing both students’ and teachers’ expressions of spatial ownership. The amount of time that students and teachers spent within particular learning environments influenced their affinity for particular physical settings and their abilities to utilise these spaces. At Suburban HS and Inner City PS the same student and teacher cohorts occupied the same learning environments for the majority of each school day. This enabled them to develop good understandings of their environments and a shared sense of ownership. At Seaside SC, however, student and teacher cohorts only occupied the Hub for approximately four hours per week. This situation created limited opportunities for students and teachers to develop shared understandings of the physical and social aspects of the Hub. Margaret (14/5/09), one of the leading teachers at the school, suggested that students and teachers found it difficult to transition between the traditional socio-spatial paradigm that operated across the rest of the school and the socio-spatial context in the Hub. This demonstrated that students and teachers required consistent access to innovative learning environments if they were to develop ownership over these spaces and become adept users of these spaces as sites for constructivist learning.

**Display and ownership**

Wall displays and other visual elements were also a factor in generating feelings of spatial ownership. This was best expressed at Inner City PS where the teachers and students collaborated to develop a number of dynamic wall displays. These displays were created to remind students of various aspects of the curriculum, to make learning visible, and to act as sites for discussion. One display in particular was intended to support the democratisation of the learning environment by enabling teachers and students to raise issues that they felt should be addressed at cohort meetings. The collaborative creation of these displays appeared to contribute to a sense of community and engender ownership of the learning environment.

At Suburban HS and Seaside SC, teachers became conscious that display of curriculum related materials and student work was critical to supporting spatial ownership and the development of constructivist learning cultures. Illustrating this increased awareness was the fact that teachers at Seaside SC strongly desired the refurbishment of the Hub to include expansive areas of pin board.

**Social relationships in innovative learning environments**

The innovative learning environments in the case study schools mediated new forms of social relations. As suggested by Foucault, such mediation appeared to be related to the ways in which the construction
of walls determined the allocation of people (Leach, 1997). In addition, furniture items appeared to influence how people interacted. Both the architecture and furniture enabled some forms of social interaction and constrained others—observations that were aligned with Giddens' theory of structuration (1979; Dovey, 2008). Giddens suggested that structures, either physical or social, could enable or constrain various forms of agency, and when discussing Giddens work, Dovey (2008, p. 19) suggested that “architecture can be considered as a form of structure, and the social action it ‘frames’ as a form of agency”.

*The influence of structural space on social relationships*

The influence that structural walls had on social relationships was particularly evident at Suburban HS where full-height and half-height walls were used extensively to suggest the number of people who should occupy certain areas. Some spaces were designed to accommodate small groups of four to 15 people, while other areas were designed to accommodate up to 20 people.

The creation of small interconnected spaces at Suburban HS was intended to constrain the gathering of large groups and force teachers to break student cohorts of 50 up into more intimate sub-groups. On the first floor of the SWiS buildings, only the ‘platform area’ and the ‘large group teaching space (south)’ (see Figures in Chapter 4) were designed in a way that could accommodate a full cohort of 50 students, but neither of these spaces was originally intended to support such gatherings. Nevertheless, teachers were quick to subvert the spatio-pedagogical/design intentions and gather cohorts of 50 students in these spaces at the beginning and end of lessons—to mark the role, provide instruction, and remind students of organisational matters.

The lack of large spaces was one of the main complaints that teachers had regarding the design of the SWiS buildings. They felt there were limited opportunities to gather cohorts of 50 students for communal experiences. As a result, tensions arose between space and practice, particularly during the early phase of occupation. Such tensions were particularly apparent on multiple occasions when I observed a team of three maths teachers gather 50 students in a space that was designed to seat only 20 students (the ‘large group teaching space (north)’ - see Figure in Chapter 4) so they could provide them with common instruction regarding mathematical operations. This practice was problematic because more than half of the 50 students were forced to stand while trying to write notes in their exercise books. A number of students complained about these and other instances when teachers asked them to occupy spaces that they believed were too small to accommodate 50 students. For example:

> It gets rather packed [in the ‘large group teaching space (north)] and you can’t really move … for 50 people the space isn’t really big enough (Lakshmi, Suburban HS student, 29/9/09).
One time in English we had presentations to do, so they packed us all in [the community of inquiry space]—all fifty of us in there. Not all fifty were on the steps, most were on the floor. They packed all of us in there, and the laptop, while people were doing their talk (Scott, Suburban HS student, 12/11/09).

Spaces of varying sizes were also created at Inner City PS and Seaside SC, and the refurbished Hub. At Inner City PS, spaces were created to enable the full cohort of 69 students to gather together, to meet in mentor groups of approximately 25, and to engage in intimate group discussions (see Figures in Chapter 4). At Seaside SC, the refurbishment of the Hub resulted in a range of different sized spaces being created, such as those intended to support communal gatherings for 75 students, tutorials for 14 students, and collaborative learning for up to 8 students (see Figures in Chapter 4). This diverse range of spaces, and settings, meant that the spaces in the refurbished Hub were distinctly different from those in the Hub as it was originally designed.

I concluded that the construction of walls, for the purpose of creating different sized spaces, was a successful approach to design as long as these spaces were readily interconnected and allowed a flow of activity. Through the creation of different sized spaces a variety of pedagogical encounters could be catered for. Their interconnection facilitated movement between a range of encounters: large spaces enabled whole student cohorts to gather for communal experiences, while smaller spaces enabled students and teachers to engage in discussion, collaborate on small group activities or concentrate on individual tasks. Although smaller spaces constrained some activities, the research conducted in the Hub at Seaside SC prior to its refurbishment clearly demonstrated that large open spaces cater poorly to most pedagogical encounters because they lack clear environmental cues (Barker, 1968) and are poor acoustically.

**The influence of furniture on social relationships**

Various types of furniture, and the arrangement of furniture, influenced social relationships. Tables, in particular, through their shape, size and arrangement, suggested purpose though environmental cues (Barker, 1968) and enabled some forms of social interaction and constrained others (Giddens, 1979). For example, triangular tables formed from three separate sections at Inner City PS were identified as unsuitable for small group collaborative activities. When these tables were configured in clusters of three – as intended by their design – students were not able to collaborate over shared documents or talk to each other across the tables without raising their voices. Following the reconfiguration of these tables into pairs, students were better able to share materials and communicate. Allan (26/8/09), one of the teachers at Inner City PS, said:
When they were as big triangles, I don't think that worked at all … and I couldn't work out what it was and then you said something to me about group work and I looked at them and I thought they are just too far apart. The kids are too far apart.

Ultimately, Allan preferred crescent or bite shaped tables, as they could be arranged in diverse formations to inform and mediate a variety of social relations. He identified formations including, long straight (for large group collaboration), paired (for small group collaboration), and separated (for students to work in pairs or individually) as conducive to a range of pedagogical encounters and learning experiences.

Feedback from students at Inner City PS and from teachers at Seaside SC regarding these crescent or bite shaped tables mirrored Allan’s contentions. One of the students at Inner city PS, Mary (17/11/09), commented that:

They [the bite tables] are a really good shape because you can make them into all different kinds of shapes. You can make them separate tables or groups of tables for group discussions … sometimes they get changed by us and sometimes by the teachers, but we have to get permission first.

The overall influence of new socio-spatial contexts for learning

Teachers suggested that new socio-spatial contexts enabled them to interact with students on a more personal level. In addition, they suggested that informal settings contributed to a relaxed social atmosphere and this facilitated improved communication between students and teachers. This was illustrated by events at Suburban HS, where teachers often emerged from the staff study area during lunch times and after hours to assist students with their projects or homework. Spatial design assisted these events by enabling students to observe teachers through a window that separated the learning commons from the staff area. On seeing the teacher they were looking for, students were observed to knock on the staff-study door and ask for assistance.

Although most teachers agreed that new socio-spatial contexts enabled them to converse with students on a more personal level, some teachers at Seaside SC and Suburban HS suggested that it was harder to get to know their students academically in their new environments than it had been when teaching 25 students in a traditional classroom. I attributed this to the fact that teachers at both schools were working with more students than previously. At Suburban HS this situation was expected to be addressed when the full complement of seven SWiS buildings was constructed. Following the completion of these buildings, it was planned that teachers would work on a consistent basis with a limited number of students, and that the same teachers would work with the same student cohorts over subsequent years as they progressed through the school.
At the more intimate Inner City PS, the teachers did not report any difficulties getting to know the 69 students in Year 5/6. They felt they knew the students better, both academically and socially, because they could discuss each student's academic and personal needs with their colleagues. In addition, it appeared that the socio-pedagogical culture at Inner City PS supported a favourable situation where students regularly directed questions to the teacher they thought could best address their particular inquiry. With regard to this practice, Allan (26/8/09), at teacher at the school, commented:

We all have our own home groups but the students know that they can come to any one of us for advice and support. Especially when we are working right across the unit … So the kids are making decisions that it is not just one teacher in the classroom. They're making decisions about who they can go to, to share particular types of work for whatever reasons … And I think it's a really healthy and important thing. And it's that sort of village idea. Now we don't consciously develop that, but we have three different personalities and three different strengths in terms of what we do and the students recognise that.

Overall, new forms of social action were enabled by the new socio-spatial contexts at the case study schools. Through collaborative design, environments were created to align with pedagogical objectives. By enabling and constraining certain activities, these spaces supported a diverse range of pedagogical encounters and learning experiences. The only clear issue of tension that arose between space and practice was associated with the lack of communal gathering spaces at Suburban HS.

A new spatiality

A new spatiality – “the created space of social organisation and production” (Soja, 1989, p.79) – was produced in the case study schools as the result of changes to the ‘space, time, being’ experiences encountered by teachers and students. Soja (1989, p. 25) suggested that “spatiality, temporality, and the social being can be seen as the abstract dimensions which together comprise all facets of human existence”. By altering these dimensions, school communities were able to develop new socio-pedagogical cultures that were characterised by decentralised social control (Upton, 2004) and a wider variety of socio-pedagogical activities.

Evidence of a new spatiality was seen in the ways students and teachers moved around, appropriated space, and interacted. For example, I regularly observed students and teachers sitting on the floor, rather than at chairs and tables, engaged in small group discussions. To see this – particularly at the two secondary schools – indicated that the spatiality had changed. In these instances teachers were not readily identifiable because their movements and behaviours were more like those of students—less directive and authoritarian and more facilitative and collaborative.
This new spatiality challenged the expectations of some teachers regarding how students should behave. Ruth (16/9/09), a teacher at Suburban HS, suggested that “as a teacher you still have the responsibility to ensure that they are on task … for some staff having students work on the floor can be quite confronting”. Nevertheless, as teachers adopted constructivist pedagogies and progressively abandoned trying to maintain tight control over students’ geographies and the flow of information and discussion, more democratic and diverse spaces were socially produced. With respect to this new spatiality, teachers stressed that good relationships between students and teachers was a prerequisite for students using space in a responsible way.

**Acoustics**

*The importance of good acoustics*

Initially, many stakeholders were concerned that the innovative learning environments in the case study schools would be plagued by poor acoustics. With regard to the Hub at Seaside SC, as originally designed, these concerns were justified. The acoustic properties were so bad that teachers were literally brought to tears when discussing the difficulties they had communicating with students in this environment. Students also commented on how noise in the Hub made learning difficult:

> It gets very noisy sometimes when there are a few classes I there … I don’t like it very much because it is like really hard to concentrate in such a big space and so you are always getting distracted … due to other kids being noisy and other classes being noisy … It kind of echoes (Kate, Seaside SC student, 6/11/09).

> At times it can be quite noisy, like the sound flows through it quite easily and it can be distracting … a couple of weeks ago we had inquiry and it was a double and it was two of our classes combined and we were fairly settled and quiet and stuff, and then another class came in and it just got absolutely ridiculous. You could not hear the teacher at all, even though she was like screaming, you couldn’t hear a word she said. And it was hard because people at the front were doing work but you were sitting there wondering what to do because you couldn’t hear what the teacher said (Tami, Seaside SC student, 6/11/09).

Prior to refurbishment, the teaching and learning practices in the Hub were not representative of the teachers’ preferred pedagogical approaches (14/5/09). Collectively, the teachers at Seaside SC identified poor acoustics and a lack of varied settings as impediments to their preferred pedagogies. They felt that the Hub was restrictive, rather than supportive, of personalised learning and suggested that they had resorted to creating a curriculum that required all students to work on the same activities at the same time in order to maintain reasonable noise levels. In addition, they expressed frustration over not being able to support students to work more independently.
During this time, teachers took dramatic action to avoid working in the Hub with large cohorts of students. Regularly, they made arrangements for one or two classes of 25 students to leave the Hub to work in the Library or in a nearby computer laboratory. Often this left only 25 students to work in an area that was originally expected to accommodate 100.

To the great relief of the staff and students at Seaside SC, the refurbishment of the Hub led to significant improvements in its acoustic performance. As I outlined in the previous chapter, acoustic baffles were applied to, and hung from, the ceiling, and sound dampening pin-board was affixed to the west side of the central tutorial space. Following these measures all of the teachers who worked in the Hub agreed that the acoustics were much better. Only the hard surfaced wet area was identified as still 'a little noisy'.

*Learning to accept the ‘learning hum’*

At Suburban HS, the acoustics of the SWiS buildings were integral to the original design. An acoustics engineer modelled the spaces and acoustic materials were applied to the ceilings throughout. However, the spaces were never completely quiet. Even when students and teachers were being quiet in one area, noise still pervaded the interconnected learning spaces. A few teachers raised concerns that teachers and students with soft voices could not be heard clearly during group discussions. However, the majority of teachers and students reported they were not disturbed by this 'background' noise. I concluded that the pedagogical advantages that had been gained through the connectivity of the spaces would have been annulled without the addition of high quality sound dampening materials. Assistant Principal, Clare (16/9/09), at Suburban HS suggested that both teachers and students had made adjustments to accept that collaborative learning was often a little noisy due to the need for conversation. She suggested that most occupants had come to accept that “the learning hum is okay”.

At Inner City PS the ‘learning hum’ was recognised as aiding the development of a supportive learning culture and supportive of positive connectedness between students and students, and students and teachers. Nevertheless, the teachers at Inner City PS suggested that this connectedness needed to be balanced against the environment becoming too noisy. Craig (26/8/09), one of the teachers at the school, commented on the noise levels:

*Sometimes it feels crazy, particularly in the larger space, and your teacher instincts go, “It’s too loud, it’s too loud. No one can work when it is like this”. And sometimes that is the case, and you need to quieten them down. I’m not saying it’s always great. Sometimes they are mucking around and you need to pull them back. But a lot of the time … they are really into what they are doing and they just want to share. And it comes out in our data—huge connectedness to other students here. They really help each other and they really support each other and they look after each other.*
Acoustic separation and visual connectedness

Through the use of large glazed sliding and hinged doors, the design of the Year 5/6 learning environment at Inner City PS enabled spaces to be acoustically separated while remaining visually connected. With options for acoustic separation, small groups of students were able to engage simultaneously in diverse and sometimes noisy activities – such as listening to audio books or watching videos – without disturbing others. Due to the extensive use of glass, teachers were able to passively supervise students as they moved between groups without having to open doors to see what students were doing.

Adopting new pedagogies

In the final section of this chapter, I discuss the processes by which new pedagogical approaches/frameworks were developed and adopted within the innovative learning environments at the case study schools.

It is worth noting that the term ‘pedagogy’ was not widely used, nor was its meaning well understood by many of the teachers with whom I came into contact. This was illustrated during a focus group forum held at Suburban HS (28/1/10), when a teacher raised the question, “What does pedagogy mean”? The ensuing discussion demonstrated that a number of teachers were still developing the ‘specialised’ language needed to discuss the finer points of their schools’ spatio-pedagogical project. Discussions, such as this provided further evidence that a significant theoretical gap existed between those teachers who participated in their profession at a practice level and those who had adopted well informed theoretical positions. The teachers’ perspectives revealed their relative grounding in educational theory and the theoretical lenses through which they viewed the events in their schools.

Space as an agent of pedagogical change

Innovative learning environments as ‘disturbance’

The innovative learning environments challenged teachers to rethink their pedagogical approaches. Assistant Principal, Clare, at Suburban HS (28/1/10) suggested that, “the physical environment is constantly reminding us to teach and work differently; it is forcing us to think more creatively”. However, shifting the pedagogical approaches of many teachers required more than just the ‘disturbance’ that shifting them into new environments caused to their professional practices. In order to instigate
pedagogical change, teachers needed professional learning support. To this end, Associate Principal, Jennifer, at Suburban HS (28/1/10) commented:

We need them [the teachers] to understand the theoretical framework for operating this way. It has involved a lot of talking, changing beliefs and changing practice … Teachers need to understand what it looks like in their practice rather than thinking "How can I retain control when using this model?"

As suggested by Jennifer, achieving pedagogical change required altering teachers’ professional belief systems. One strategy for supporting teachers to develop new understandings about contemporary middle years learning theory was to provide them with opportunities to ‘experiment’ with new pedagogies, and subsequently provide them with time and opportunity to reflect upon these experiences.

**Pedagogical experimentation**

At Suburban HS, opportunities for pedagogical experimentation were embedded within the curriculum. ‘Immersion weeks’, conducted for one week per term, enabled teachers and students to escape their past practices and trial new approaches to teaching and learning. An interdisciplinary approach was prescribed by the schools’ leaders and this appeared to liberate many teachers from discipline-based epistemologies and make them more inclined to trial new pedagogies. Assistant Principal, Clare (16/9/09), suggested that pedagogical experimentation played a vital role in supporting teachers to learn to use the spaces at Suburban HS. She said:

> You have to acknowledge that you have to learn how to use the space. You have to give yourself time to learn and to experiment, and acknowledge and accept the power of the space. And I think that sometimes we don’t do that. It is a process. You have got to know the spaces and the spaces have got to know you.

During the immersion weeks at Suburban HS, many teachers took advantage of the varied spaces to trial new activities. In many instances these activities were better aligned with the theoretical perspectives that had informed the design of the schools’ innovative learning environments than the regular non-immersion week activities. In addition, themes for these immersion weeks encouraged the co-construction of curriculum with students. Themes such as ‘Who are we? Where do we come from?’ encouraged connections between the life experiences of students and learning at school—and were aligned with the discourse on critical pedagogy.

The value of the immersion weeks at Suburban HS is illustrated in the following quote from Assistant Principal, Clare (28/1/10), who described the pedagogical transition that teachers and students made as they trialled new approaches to teaching and learning:
We have had to learn to use the spaces. There has been a continuum from past pedagogy to the current pedagogical practices. As the teachers become more comfortable they allow for a greater variety of activities to occur in the spaces ... Students are learning to use the spaces independently in ways not intended by the teachers. Students use the space in spontaneous ways that are developed from their natural ways of learning. Really good sensitivity to the concepts and theories of learning is required to understand what is going on upstairs—where the learning spaces allow for freedom and choice of environment and resources. The new learning spaces invite choice, rather than a traditional classroom that required continuous decisions to be made [by teachers] before activity was initiated.

*Mathematics education and spaces for constructivist learning*

The mathematics teachers at the two secondary schools appeared to be the most resistant to constructivist pedagogies and innovative learning environments. At Suburban HS, some maths teachers initially questioned the effectiveness of constructivist and inquiry-based pedagogies and suggested that these approaches would not support students to ultimately attain good mathematics results in their final year assessments. These teachers were concerned that non-instructivist approaches to mathematics education would result in students not ‘getting through’ sufficient subject content and leave them with significant gaps in their knowledge and understanding of maths when they reached VCE.

Initially, these maths teachers maintained strictly instructivist pedagogies. This led to some problematic spatial situations, such as when 50 students were crammed into a space that was designed to seat only 20 people, as mentioned previously. In this situation, one teacher conducted the class while the other two watched. I attributed these events to differences between the epistemological positions from which these teachers operated and the constructivist educational theories that had informed the designs of the spaces. The pedagogies previously employed by these teachers in traditional classrooms had required students to work from texts books in steps and stages. When teachers were thrust into innovative spaces and expected to adopt constructivist/inquiry-based pedagogies it was perhaps not surprising that they had difficulty adjusting to the pedagogical expectations and the environment.

After six months occupation of the new spaces, one of the more progressive maths teachers, Ruth (16/09), was not prepared to say that the environment supported maths education:

> I’d like to say that it does. It does and it doesn’t … We want to do more inquiry … we have tried a little bit of inquiry but it didn’t really go in the direction that we thought it would … but you can’t do inquiry for everything … Maths has to be quite structured because it is sequential.

At Inner City PS too, the historically instructivist nature of maths education seemed somewhat at odds with the overall pedagogical vision. Certainly, teachers gave more instruction to students during maths than during lessons associated with other learning domains.
The tension between space and practice observed during maths lessons led me to wonder whether the development of new curriculum, pedagogy and assessment practices could overcome this apparent lack of alignment between space and practice in all instances. I began to reflect on whether it was reasonable for all learning domains to be taught with a common approach and to what extent pedagogies should differ between learning domains. Did mathematics education require spaces specifically designed to support direct instruction?

The ‘Earn and Learn’ (Vingerhoets, 1993) project conducted at Inner City PS, however, demonstrated that constructivist learning and maths education were not mutually exclusive. The idea of this project was to mimic a ‘real life’ economy. The project required students to take on a variety of community roles, including those of government officials, bank managers, real estate agents, and business leaders, and involved them buying and selling commodities using play money and an electronic banking system they set up using the Excel program.

The conduct of the ‘Earn and learn’ project was supported by the large scale of the Year 5/6 learning environment and the variety of activity settings and resources found within. Students flowed throughout the spaces to appropriate chairs and tables, worked on computers, and shifted ottomans to create spaces to communicate and exchange products or services. Once the teachers had set up the project, they could stand aside to allow the students to get on with it, responding to questions from students as they arose. During the conduct of this project virtually every student was regularly and thoroughly engaged in constructivist, self directed learning. Indeed, some of the more reluctant maths students were found to work on their ‘wealth creation’ schemes during lunchtimes.

The maths curriculum at Suburban HS did not include projects that were of a comparable nature to the ‘Earn and Learn’ project at Inner City PS. However, as time passed teachers began to introduce more problem-based learning activities. With opportunities to reflect on their practices and support from the school leaders, the teachers who had crammed 50 students into the space for 20, developed new pedagogies that saw them rotate students through a range of instructivist and constructivist activities—each led by a different teacher and conducted in neighbouring physical settings. With this rotational system, students were offered a range of complementary experiences that supported their deeper participation in the maths curriculum. The system also enabled students to work closely with each of the three teachers in the team and encounter maths through a range of different perspectives.

Following their early difficulties, this team of maths teachers suggested that they could further improve their new pedagogies if they had better access to resources. To this end, they made requests to the school leaders for more resources, better storage facilities and more computers. A positive outcome of
these developments was that the teachers recognised that they had learnt new skills from their colleagues and wished to continue their collaboration.

**Pedagogical change and the subversion of design intentions**

Should practices inform space, or spaces inform practice?

A key issue debated by school leaders and teachers was whether or not learning environments should inform curriculum and pedagogy. Some teachers believed that innovative learning environments should not ‘dictate’ the types of learning activities that were offered to students. They argued that space should not inform practice. Their arguments, however, appeared to ignore the influences that traditional classrooms had on their prior practices and were framed around the challenges that innovative environments presented to them. Meanwhile, the opinion of the school leaders across the case study schools was that desired curriculum and pedagogy frameworks had informed the design of their new learning environments and it was therefore desirable that these new spaces inform practice.

**Hybrid pedagogies and the unexpected use of space**

Towards the end of the fieldwork phase of this study, school leaders at Suburban HS acknowledged the tensions between the intended pedagogy and the practices being enacted within their new learning environments. Associate Principal, Jennifer (28/1/10), suggested that the pedagogies that had been developed were mixtures of old and new practices. She also suggested that these hybrid practices had led to the learning spaces being used in ways not anticipated at the time of design. The following quote from Alexander (1979, p. 13), summed up how the use of space at Suburban HS, and the other case study schools, had evolved beyond the design intentions:

> No building is ever perfect. Each building, when it is first built, is an attempt to make a self-maintaining whole configuration. But predictions are invariably wrong. People use buildings differently from the way they thought they would.

Although school leaders had wished to see ‘cultures of use’ established in particular settings, most spaces were used in a variety of ways. For example, the platform area at Suburban HS was intended to be a quiet space where students could work on the floor in small groups. While it often fulfilled its intended purpose, these design intentions were regularly subverted and this space was used to host cohort meetings. Thus this setting, and others, facilitated a range of pedagogical encounters.
Aligning space and practice to create new behaviour settings

As they developed new environmental and pedagogical competencies, teachers and students became better equipped to take on the task of creating new behaviour settings (Barker 1968). In order to develop new standing patterns of behaviour (programs) within innovative learning environments, teachers found that they needed to redefine their roles and students found that they needed to take on more responsibility and become more independent learners.

In many ways, the behaviour settings that began to emerge were in accordance with Dewey’s (1966) ideas about learning being constructed through social interaction and experience. The roles that teachers and students played in these settings reflected Dewey’s (1966) contention that the quality of learning is realised in the degree to which individuals form a community group. Further to this, Dewey (1966) suggested that it was absurd to exclude the teacher from membership of this group. He recommended that as the most mature member of the group, the teacher should take on a particular responsibility for the types of interactions that occur between group members and the groups’ experiences. He described this as the very life of the group as a community.

Teachers as leaders of constructivist education

As mentioned previously, the professional identities that many teachers held while teaching in traditional classrooms were challenged by innovative learning environments. Some teachers responded to this challenge by clinging to their old ways and complaining about the changes that were going on around them. Others, however, sought to redefine their roles and form new professional identities that were in keeping with the spatio-pedagogical projects that were being pursued in their school. Change of this type was viewed by school leaders as a step forwards in terms of the professionalism that teachers exhibited.

Thinking collaboratively and creatively about varied pedagogical approaches was integral to teachers adopting new roles as leaders of constructivist education. To this end, Allan, a teacher at Inner City PS (26/8/09), suggested that teachers needed to think more like artists in order to develop and lead constructivist learning experiences. He believed a teacher’s imagination was what allowed them to operate on a level that went beyond carrying out a function that had been prescribed by others, to become developers of constructivist educational experiences.

The key factor that supported the development of constructivist learning experiences and effective use of innovative spaces was when teacher’s recognised that project-based activities were better suited to innovative learning environments than were individually structured lessons. While individual lessons necessitated teacher control and direction, project-based activities allowed students to engage in multi-
modal learning experiences, develop curriculum with teachers (again, links to critical pedagogy), and be more self-directed learners. Teachers identified inquiry-based approaches as better suited to innovative learning environments and supportive of the development of students’ higher order thinking skills—including those of comprehension, evaluation, application, analysis, and synthesis (Bloom et al., 1956). At Seaside SC, both Margaret (30/4/09) and Dani (14/5/09) described a significant learning situation during which they had set up a variety of activities for 50 students to pursue as part of a larger project. The activity sites were distributed around the Hub and students were asked to complete each activity in their preferred order. When reflecting on these events, Margaret said that she had been pleased to see the students work with some independence. This situation indicated that these teachers had begun the process of developing constructivist approaches to teaching and learning—approaches that were better supported once the Hub was refurbished.

Instructivist pedagogies still played an important role in the case study schools. In general, they were used to introduce students to areas of study, to scaffold students’ understandings of subject content, and to introduce them to new academic skills, and were employed by teachers intermittently throughout the time that students pursued projects, or units of work. In this way, teachers employed a range of pedagogies from across a pedagogical continuum to support student learning—both constructivist and instructivist.

The pedagogies that teachers developed were generally quite responsive to students’ needs. Some teachers found that regularly rotating students through activities that were each facilitated by a different teacher provided a good structure for engaging students in a range of learning experiences, while others found that ‘difficult’ student cohorts responded better to working with the same teacher on a more consistent basis.

In some instances students were sorted by ability. At Inner City PS, students were streamed into like-ability groups for some aspects of their maths and English curriculum. This approach was informed by a philosophical position that suggested that periods of direct instruction should be targeted to the needs of individual students. The school leaders and teachers at Inner City PS suggested that students who were highly competent in a particular area should not be subjected to instruction that they did not need. Furthermore, they suggested that ‘targeted’ teaching was aligned with the concept of personalised learning. At Suburban HS, a ‘targeted’ teaching approach was employed to support the needs of English as a Second Language (ESL) students. These students were able to receive specialised support from ESL teachers in settings adjacent to those occupied by the rest of their student cohort. Thus, the old paradigm of removing high-needs ESL students from ‘normal’ classes was overcome. Ruth (16/9/09), a teacher at Suburban HS, reported that the rate of progress of these high needs ESL students had improved, particularly that associated with their personal and social development.
Developing dynamic behaviour setting ‘programs’

The new program components (Gump, 1980) of the behaviour setting that were developed in the case study schools often appeared to be quite chaotic. To first time visitors, these new programs may not have looked like programs at all. For example, the regular movement of students during the ‘Earn and learn’ project at Inner City PS may have been perceived as highly disorganised. However, the students and teachers understood how the program operated and were readily able to pursue their roles within the setting. Developing dynamic behaviour settings of this nature required considerable skill on the part of teachers, who were responsible for the social production of these behaviour settings.

Agents that limited the development of new human geographies and socio-pedagogical cultures

A number of agents were found to limit the development of new human geographies and socio-pedagogical cultures. The most obvious of these were illustrated by the original design of the Hub at Seaside SC—poor design and poor acoustics. Other limiting agents included the timetable, externally mandated curriculum, assessment, and reporting requirements, and low rates of ICT usage.

Limitations associated with the timetable

Lessons of short duration were found to disrupt the flow of student-centred learning activities. Evidence for this was seen in the Hub at Seaside SC, where lesson durations were 50 minutes but teachers tried to ensure that lessons ran for double periods. To their dismay, this was not always possible due to the structure of the school’s timetable. Consequently, teachers became frustrated because time allocations often did not support their desired pedagogies. Following the refurbishment of the Hub, teachers at Seaside SC were especially interested in adopting longer lessons, as they believed that longer blocks of time enabled students and teachers to make better use of the physical settings in the Hub. They identified single periods as unproductive and suggested that double or triple periods enabled students to work on a range of related activities and were better suited to constructivist learning.

At Inner City PS, the teachers had more control over their timetable, but still complained that opportunities for spontaneous tangents and impromptu experiences were often disrupted due to timed lesson changes. Allan (26/8/09), one of the Inner City PS teachers, suggested that time based structures frequently disrupted students from going on with interesting aspects of their learning. At Suburban HS, the school operated on a four period day (75 minutes lessons) to ensure that the flow of learning activities was not interrupted too often. In some instances, lessons at Suburban HS ran over two 75 minute periods.
These findings correlated with those of Sharan (2003), who suggested that schools with larger class sizes have extended the duration of lessons to provide teachers with opportunity to adopt alternative methods of instruction and enable students and teachers to pursue in-depth projects, individually or in cooperative groups. Furthermore, Sharan suggested that longer lessons allow “students to concentrate their energy and not feel torn between many topics competing for their energy and time” (Sharan, 2003, p. 213).

**Limitations associated with ICT**

Adam (15/9/10), a teacher at Seaside SC, described himself as a “dinosaur” when it came to utilising ICT in the delivery of curriculum. He, along with a number of other teachers, acknowledged that their lack of proficiency with ICT limited the opportunities for their students to learn using new technologies. In the same way that teachers recognised that they needed to become better acquainted with the affordances of new physical environments, they also recognised that they needed to develop better understandings of the role that virtual environments/digital learning experiences could play in supporting the delivery of curricula.

**Limitations associated with externally mandated curriculum, assessment, and reporting requirements**

A number of teachers reported that external demands associated with curriculum, assessment, and reporting limited their ability to develop new pedagogies. With a strong desire to fulfil what was expected of them as educators, most teachers felt obliged to follow the curriculum as prescribed by the Victorian Essential Learning Standards (VELS). Those who adhered strictly to the curriculum appeared to find it difficult to imagine new practices, while those who interpreted the curriculum in creative ways appeared more inclined to develop and adopt new pedagogies.

Externally mandated curriculum, assessment and reporting procedures also limited the development of new human geographies. Some teachers at Seaside SC expressed concern that they could not accurately assess and report on student work if students were constantly moving between activity settings and discussing their learning with multiple teachers. It appeared that allocating responsibility for reporting on a group of 25 students led these teachers to work exclusively with ‘their’ students. Subsequently, this limited opportunities for collaboration between students and multiple teachers and raised questions about how student-centred learning within innovative learning environments could be accurately assessed and reported on. At Suburban HS, this question was addressed by asking teacher-teams to collaboratively assess and report on all 50 students in a cohort. In general, teams of three teachers approached this task by allocating specific tasks to each member of the team. Then, each of the
three teachers reviewed the reports before they were finalised. In this way, the perspectives of three teachers were represented in each student’s report for each learning domain.

**Conclusion**

In this chapter I addressed the second of the subsidiary research questions: *How are innovative middle years learning environments influencing pedagogies?* In doing so, I reported and discussed findings associated with the occupation and use of the innovative learning environments in the case study schools.

The theoretical perspectives that informed the research presented in this chapter – critical theory of space, critical human geography, social meanings of space and behaviour settings theory – provided a collective framework through which I explored how these environments influenced teachers’ and students’ geographical experiences and their educational practices. In particular, the lenses of critical theory of space and critical human geography enabled me to examine the events that played-out in the case study schools within the context of the construction and configuration of human geographies and the social production of space (Soja, 1989). Below, I highlight the main findings from the chapter and I use these to draw some further conclusions.

*Innovative learning environments: a catalyst for pedagogical and cultural change*

This research revealed that innovative learning environments catalysed pedagogical and cultural change by challenging the prior practices of teachers and students. Innovative learning environments did not, however, directly shape new practices.

This finding concurs with Barker and Gump (1964; Gump, 1974; 1980) and Angus, Evans and Parkin (1975), who respectively concluded that schools of open design do not necessarily lead to changes in instructional programs and particular pedagogical approaches do not automatically match with particular schools.

Pedagogical and cultural change was only achieved after overcoming early tensions and resistance to change from groups of teachers. While some responded positively to the educational and professional opportunities offered by new spaces, others expressed unease, apprehension and apathy regarding new environments and changes to curriculum, pedagogy and assessment practices.

Shifting pedagogical approaches required more than just the ‘disturbance’ that new environments caused. The majority of teachers required professional learning support in order to adopt constructivist
pedagogies and further assistance from school leaders and others before they took advantage of the affordances of innovative spaces.

*Initial geographic and pedagogical bewilderment*

Upon transition into innovative learning environments, many teachers demonstrated difficulty adapting their educational practices to suit the intentions of new spaces. In many instances they did not recognise the settings that confronted them. They found working with students to develop new behaviour settings conducive to learning challenging because they were uncertain how behaviour settings that supported contemporary constructivist pedagogies should operate.

This finding reflected Rodwell (1998), who suggested that teachers became confused by their educational roles when open school architecture was imposed upon them during the 1970s, and Beck (1980), who concluded that educational programs suffered when open plan architecture was imposed without adequate support for teachers.

The majority of students made the transition into innovative environments with relative ease. They enjoyed their new found geographic freedom and the variety of pedagogical encounters that their new spaces enabled. This finding concurred with Meyer (1971), who found that students in open plan schools felt a greater sense of autonomy.

An exception to this ease of student transition was witnessed in the Hub at Seaside SC, prior to its refurbishment. This large homogeneous environment left students geographically and pedagogically bewildered and unsure how they should behave or participate in learning activities. Subsequently, this placed pressure on teachers to try to socially produce behaviour settings that were appropriate for learning in an environment that provided few environmental cues to direct the students’ activities. As many students identified intimate settings as their favoured locations for learning, this appeared to explain, at least in-part, why students found transition into the socio-spatial context in the pre-refurbished Hub difficult.

*Cultural change, collaboration and the social production of innovative learning environments*

My observations and interviews revealed that although innovative learning environments mediated new forms of social relations, many teachers were not initially empowered when it came to appropriating or manipulating unfamiliar settings to support their pedagogical objectives. In general, teachers lacked environmental competencies. However, as their perspectives on how learning occurred changed, they
developed new practices, began to embrace the educational opportunities afforded by innovative learning environments and developed new environmental competencies that allowed them to make better use of innovative spaces.

Subsequent spatial and pedagogical experimentation by teachers and students supported the social production of these environments. Via this process, a new spatiality developed. It was characterised by students and teachers moving within and between physical settings to appropriate space and manipulate objects to suit their pedagogical needs. This new spatiality revealed teachers and students interacting with each other on a more personal level.

The social production of space in the case study schools was driven by discourse and collaboration. Initially, teachers worked together in teams to develop and later refine new pedagogical frameworks in response to new physical settings and the expectations of school leaders – a process enhanced by the co-location of teachers in common study areas. Subsequently, ongoing discourse and collaboration with students supported the creation of shared understandings regrading the expected norms of behaviour. With this, new geographical and pedagogical practices were developed.

Spatial ownership and surveillance were revealed to play key roles in supporting the development of new socio-pedagogical cultures. The shared ownership of space was found to support democratisation of the learning situation and enable students to pursue learning activities with greater self-direction. Surveillance by both teachers and students was observed to encourage social cohesion and enable teachers and students to work together collaboratively. This research showed that for collaborative learning to occur, teachers needed to discard highly structured lessons and ‘standover tactics’ and develop constructivist pedagogical frameworks that guided student learning.

*Professional learning and the adoption of constructivist pedagogies*

Shifting the value systems through which teachers framed their professional conduct was found to be essential for bringing about pedagogical change. Engaging teachers in discourse about contemporary educational theory, as well as allowing time for reflection, were suitable techniques for developing their understandings of contemporary pedagogies and refocussing the lenses through which they interpreted what was going on in particular learning situations. In addition, the new environmental competencies that teachers and students developed enhanced their ability to employ constructivist pedagogies. With opportunities for spatial and pedagogical experimentation and reflection, ineffectual pedagogies and spatial usage schemas were cast aside, while those found to be more effective were continued and refined.
The new pedagogies that were developed in the case study schools were of a hybrid variety—mixtures of old and new pedagogies. These hybrid practices resulted in innovative learning environments being used in ways that had not been anticipated at the time of design. To this end, instructivist pedagogies were found to still play an important role. They were used to introduce students to areas of study, to scaffold students’ understandings of subject content, and to introduce them to new academic skills.

Thinking collaboratively and creatively about varied pedagogical approaches was integral to teachers adopting new roles as leaders of constructivist education. As they developed new environmental and pedagogical competencies, they became better equipped to take on the task of creating dynamic behaviour settings that could support socio-pedagogical cultures that were conducive to learning.

**Factors found to limit the adoption of contemporary constructivist pedagogies**

Evidence collected regarding teachers’ and students’ experiences in the pre-refurbished Hub at Seaside CS revealed that poor design, characterised by limited spatial differentiation and poor acoustics, substantially hindered the development of contemporary constructivist pedagogies. On the other hand, the spaces at Suburban HS, Inner City PS and in the Hub post-refurbishment showed that purposeful, interconnected spaces that allowed a flow of activity eased the burden on teachers to elicit desired behaviours from students, supported the creation of variety of behaviour settings by communicating pedagogical intent and aided the development of contemporary constructivist pedagogies.

Constructivist learning was found to require regular verbal communication between students and students and teachers. Consequently, spaces that could accommodate the ‘learning hum’ were required. The inclusion of high quality acoustic materials that reduced sound volume and reverberation and the creation of acoustically separated zones within learning environments was identified as critical to the adoption of constructivist pedagogies. Furthermore, this research demonstrated that poor acoustic design hindered the adoption of constructivist pedagogies by placing pressure on teachers to revert to highly structured teacher-directed pedagogies.

Traditional timetabling arrangements also restricted the adoption of constructivist pedagogies. Lessons of a short duration (approximately 50 minutes) were found not to be supportive of constructivist learning. Lessons of a longer duration (up to 150 minutes) better supported student participation in a variety of related constructivist learning activities.

The limited proficiency of teachers with ICT also reduced opportunities for students to learn via virtual/digital learning experiences. It also hindered participation in inquiry-based, self-directed project work.
Finally, when teachers did not use their imagination when working to the externally mandated curriculum, assessment and reporting requirements, they found it difficult to implement new practices. This, in turn, limited the adoption of contemporary constructivist pedagogies.

Towards spatio-pedagogical change

The relative magnitude of the spatio-pedagogical projects at the case study schools revealed that spatio-pedagogical change was easier to achieve within smaller social settings than in larger social settings. Evidence for this was seen at the smaller, more intimate learning community at Inner City PS, where three teachers and 69 students readily adapted to the new socio-spatial context in the Year 5/6 learning environment. In contrast, the substantially larger learning communities at Seaside SC and Suburban HS found that getting everyone ‘on side’ and ‘moving in the same direction’ an enormous task—one that appeared likely to be ongoing for a number of years, although much progress had been made by the time the fieldwork for this research was finalised.

The findings presented and discussed in this chapter clearly indicate that teachers require ongoing professional learning opportunities if they are to adopt contemporary constructivist pedagogies and make the most of innovative learning environments. A combination of external professional development seminars and regular internal learning opportunities which expose teachers to contemporary educational theory, address new spatial usage schemas and provide opportunities for reflection on past and current practices appears to be necessary. In addition, students require regular opportunities to discuss with teachers how they can get the most out of innovative learning environments to engage in contemporary constructivist learning activities.

In the following chapter, Chapter 7, I address how the combined influences of innovative learning environments and contemporary constructivist pedagogies affected the socio-pedagogical cultures in the middle years and the influences this had on student engagement. In addition, I discuss how the effectiveness of innovative middle years learning environments could be evaluated—specifically regarding the ways in which they support contemporary constructivist pedagogies and student engagement.
Chapter 7: The effectiveness of innovative middle years learning environments

Introduction

In this third of three findings and discussion chapters the following subsidiary research questions are addressed: How are innovative learning environments and contemporary constructivist pedagogies collectively influencing socio-pedagogical cultures in the middle years and what impact is this having on student engagement? How can the effectiveness of innovative middle years learning environments be assessed for their influence on pedagogical practices and student engagement?

In order to address these questions the chapter is divided into three main sections: ‘the development of new socio-pedagogical cultures in innovative learning environments’, ‘emergent behaviours and student engagement’, and ‘the overall effectiveness of innovative learning environments’. These section headings emerged from my analysis of the field-data. An introduction to the theoretical frameworks that informed my analysis of the field data and supported my discussion of the findings precedes these sections.

As in the previous findings and discussion chapters, aggregated findings from across the case study sites are presented with specific sites referred to in order to illustrate particular phenomenon. Again, the findings are augmented with quotes extracted from interviews and focus group forums. The voices in this chapter are those of school leaders, teachers and students.
In the following section, I outline the theoretical frameworks that I used to analyse the field-data and which I use in this chapter to frame discussion of the research findings. This outline includes discussion of the literature on ‘complexity theory’ and ‘complex adaptive systems theory’. I use these theoretical frameworks to explore the influences that new socio-spatial contexts for learning had on middle years’ socio-pedagogical cultures and student engagement. I also use them to discuss the effectiveness of the innovative learning environments in the case study schools and to develop an argument regarding how the educational effectiveness of these and other innovative learning environments can be assessed.

**Theoretical frameworks for analysis and discussion**

**Complexity theory and complex adaptive systems theory**

*An introduction to complexity theory*

Complexity science, or complexity theory as it is now more widely known, was established during the 1980s. This research perspective constituted a move away from the reductionist Newtonian model of scientific inquiry. In the Newtonian model, phenomena are reduced to their simplest components in an attempt to objectively investigate and describe a system’s properties. On the other hand, complexity theory posits that it is impossible to achieve accurate understandings of a system’s properties through the application of reductionist approaches. As such, Newtonian science is not thought to deal adequately with the emergent properties of systems produced via dynamic interactions between agents/components (Heylighten, 2008). While Newtonian-informed epistemologies valued objective perspectives, complexity theory views knowledge as being intrinsically subjective (Heylighen, Cilliers & Gershenson, 2007).

In complexity theory, a distinction is made between ‘complicated systems’ (systems with many parts, each of which may be identified and explained) and ‘complex systems’ (systems with many parts, not all can be identified, and not all of the interactions between parts can be tracked or described) (Haggis, 2003). Heylighen, Cilliers and Gershenson (2007, p. 11) provided the following overview of complexity science/theory:

> What distinguishes complexity science is its focus on phenomena that are characterized neither by order ..., nor by disorder ..., but that are situated somewhere in between ... In a truly complex system ... components are to some degree independent, and thus autonomous in their behaviour, while undergoing various direct and indirect interactions. This makes the global behaviour of the system very difficult to predict, although it is not random.
Complexity and sociology

Since the 1990s, complexity theory has grown in parallel with postmodern philosophy (Heylighen, Cilliers & Gershenson, 2007). It has been used by sociologists who wished to move away from the conventional linear analyses of structure or agency/action (Law & Urry, 2004). In particular, complexity theory has been used in sociology to investigate, but not predict, ‘emergent’ and ‘self-organising’ systemic properties associated with non-linear systems that involve people (Law & Urry, 2004). In applying complexity theory in sociology, Law and Urry (2004) argued that social science in contemporary society is more about connection and flow than about nineteenth-century concepts of territorial boundaries. They commented that inherited sensibilities in the social sciences are under pressure from an “alternative, complex and performative sense of social inquiry” (Law & Urry, 2004, p. 403).

Complex adaptive systems theory

Complexity theory has given rise to the concept of complex adaptive systems – systems that “spontaneously organize themselves so as to better cope with various internal and external perturbations and conflicts” (Heylighen, 2008, p. 2). Heylighen, Cilliers and Gershenson (2007, p. 11) described the role of agents in complex adaptive systems as follows:

The basic components of a complex adaptive system [defined by Holland (1995)] are called agents ... Intuitively agents can be conceived as autonomous individuals who try to achieve some personal goal or value (“utility” or “fitness”) by acting upon their environment – which includes other agents. But an agent does not need to exhibit intelligence or any specifically “mental” quality, since agents can represent systems as diverse as people, ants, cells or molecules. In that respect, complexity science has assimilated the lessons from cybernetics, refusing to draw any priori boundary between mind and matter.

Urry (2008) identified complex adaptive systems as being simultaneously economic, physical, technological, political and social, and described them as powerful systems in the contemporary world. He suggested that these self-organizing systems are characterized by the presence of ‘positive feedback loops’ which ensure a state of continuous change within a particular system. The dynamic and non-linear nature of these systems is also thought to create systems that ‘learn’ as they respond to changes in the system (Davis & Sumara, 2006).

Complex adaptive systems may be contrasted with systems governed by ‘negative feedback loops’. Just as a thermostat may regulate the temperature of a heating element, negative feedback loops act to maintain systems in a state of static equilibrium, or homeostasis (Urry, 2008). Law and Urry (2004) suggested that complex adaptive systems cope well with turbulence or shocks because change is a consistent aspect of the function of these systems. They suggested that static systems, governed by
negative feedback loops, have difficulty dealing with shocks or stresses because change is not common to, or welcomed, by such systems. While systems informed by negative feedback loops try to reestablish equilibrium within the system when disruptive events occur, complex adaptive systems, governed by positive feedback loops, allow adjustments to be made to the system in response to change agents.

In complex adaptive systems, non-linearity is thought to reduce the likelihood that cause and effect relationships may be identified (Urry, 2008). In instances where cause and effect relationships can be identified, they are considered to be rarely proportional: small changes in a system may produce large effects, while large changes in a system may produce only small effects. Furthermore, system effects are not thought to result from simple additions of individual components (Law & Urry, 2004) and agents acting on a system are not thought to produce single or confined effects. Instead, "interventions or changes will always produce an array of possible effects across [a] system" (Law & Urry, 2004, p. 401).

**Emergence, co-evolution and mutual adaptation**

The concept of ‘emergence’ is central to complexity theory. Emergent properties may, in a general sense, be conceived of as “properties that cannot be reduced to the properties of the parts” (Heylighen, Cilliers & Gershenson, 2007, p. 5). In a sociological context, emergent properties may refer to the development of regularities of behavior that transcend the components of a system. Emergent behaviours cannot be attributed to the component parts of a system and emergent properties of a system cannot be reduced to individual factors/parts (Urry, 2008). Rather, emergent behaviours occur as the result of the non-linear and dynamic interactions that take place within a complex adaptive system.

Complex adaptive systems generate emergent social behaviours through ‘co-evolution’ and ‘mutual adaptation’ (Urry, 2008). Although the pathways of co-evolution and mutual adaptation may be investigated and described, they are impossible to predict accurately. Urry (2008, p. 265) commented on these ideas as follows:

> Because of how systems co-evolve and mutually adapt it is almost impossible for social groups to anticipate what in certain circumstances would be the means of effecting appropriate system change. So although many social groups are seeking to realize various projects of change it is enormously hard to do so in ways that produce anything like the intended outcomes.

In addressing the concept of co-evolution, Walby (2003) suggested that complexity theory can now be used to re-frame accounts of social change as co-evolution may replace the notion of cause and effect between agents/entities. Additionally, Urry (2008) made the point that locked-in institutional processes, characteristic of large scale systems influenced by negative feedback loops, are extremely hard to
change because billions of agents around the world have co-evolved and adapted in line with these processes.

*Complexity theory and education*

Davis and Sumara (2006) presented ‘complexity thinking’ as an appropriate attitude for educators and educational researchers. They identified a ‘complex perspective’ as one that supported subjective understandings of “interpersonal dynamics, cultural evolution and issues regarding the unfolding of more-than-the-human world” (Davis & Sumara, 2006, p. 3). Further to this, Cohen, Manion, and Morrison (2007) suggested that conducting educational research through the lens of complexity facilitated a holistic view of phenomena—including individuals, families, students, classes, schools, communities and societies.

Cohen, Manion, and Morrison (2007) described complexity theory as an emerging paradigm in educational research, one that concentrated on “uncertainty, networks and connection, self-organisation, emergence over time through feedback and the relationships of the internal and external environments, and survival and development through adaptation and change” (Cohen, Manion, & Morrison, 2007, p. 33). In elaborating on the role of complexity theory in educational research, Cohen, Manion, and Morrison (2007, p. 34) suggested that:

> Complexity theory, a comparatively new perspective in educational research, offers considerable leverage into understanding societal, community, individual, and institutional change … In addressing holism, complexity theory suggests the need for case study research methodology, action research and participatory forms of research, premised in many ways on interactionist qualitative accounts, i.e. looking at situations through the eyes of as many participants or stakeholders as possible. This enables multiple causality, multiple perspectives and multiple effects to be charted … research in education could concern itself with the symbiosis of internal and external researchers and partnerships. Just as complexity theory suggests that there are multiple views of reality, so this accords not only with the need for several perspectives on a situation (using multi-methods), but resonates with those tenets of critical research that argue for different voices and views to be heard.

This perspective on educational research resonated well with the approach that was taken in this study. As described in Chapter 3, the methodology and methods chosen for this project were aligned with the ideas put forward by Cohen, Manion, and Morrison (2007) regarding the links between complexity theory and educational research.
Complexity theory and school architecture

Upitis (2004; 2010a; 2010b) explored complexity theory as a theoretical framework for investigating the connections between school architecture and learning. She explored schools as complex systems and discussed the dynamic interactions between social and physical agents within and beyond schools. She put forward the notion that educational reform could not happen within the context of traditional school buildings and suggested that there was opportunity for architects and educators to effect change in building structures to align the environments in which students learn with contemporary educational philosophies and practices.

The use of complexity theory and complex adaptive systems theory in this chapter

In this chapter, I attempt to build on the discourse that was initiated by Upitis (2004; 2010a; 2010b) regarding the connections between complexity theory, educational practices and school architecture. Specifically, I use complexity theory and complex adaptive systems theory to develop understandings of the emergent behaviours that occurred in the case study schools, especially those associated with socio-pedagogical cultures and student engagement. Furthermore, I use these conceptual tools to discuss the effectiveness of the innovative learning environments and to develop ideas regarding the role that innovative architecture can play within a complex adaptive system of education.

The emergence of new socio-pedagogical cultures in innovative learning environments

In this section I discuss how new socio-spatial contexts for learning emerged via dynamic interactions between space and practice. Subsequently, I describe how these new contexts for learning co-evolved with new socio-pedagogical cultures. As suggested by complexity theory, not all agents that acted on the social settings in the case study schools could be identified, nor their interactions tracked or described. However, it is my contention that dynamic and non-linear interactions between innovative learning environments, pedagogies, curricula, assessment practices, teachers and students led to the emergence of new socio-pedagogical cultures that were aligned with the educational objectives of the case study schools – as described in Chapter Five.
The case study schools as complex adaptive systems

Throughout this chapter, I develop an argument for the case study schools to be conceived of as complex adaptive systems. This is not a new idea. Semetsky (2005), Bower (2006), Davis and Sumara (2006), Cohen, Manion, and Morrison (2007), and Sumara and Davis (2009) all promoted complexity theory as an appropriate lens through which to explore the complex nature of schools and school reform. In addition, Keshavarz et al. (2010) specifically identified schools as social complex adaptive systems. While these academics focused largely on the social components of these systems, my conception of ‘the school’ as a complex adaptive system includes the physical environment as part of the system. In conceiving the system in this way, I make no distinction between mind and matter components/agents (Heylighen, Cilliers and Gershenson, 2007) and align my concept of the school as a complex adaptive system with that of Upitis (2004), who identified physical space as an important agent in these non-linear and dynamic systems.

It is important to note that the schools studied in this project were not considered to be closed systems. On the contrary, they were conceived of as open systems (Heylighen, Cilliers & Gershenson, 2007) that allowed people, information, materials, etc. to flow in and out in order to maintain their function.

Creating new socio-spatial contexts for learning

As described in the previous chapter, the designs of the innovative learning environments in the case study schools were found to catalyse pedagogical change. Reciprocally, the pedagogies that were employed were found to influence the ways in which these learning environments were socially produced and used. Observations of these complex interactions revealed the emergence of new socio-spatial contexts for learning.

Integrating purposeful settings to create new socio-spatial contexts for learning

The creation of learning environments that were composed of purposeful, diverse, and interconnected settings enabled particular areas to be appropriated for specific learning activities. For example, some areas were developed as quiet settings for reflective or individual work, while other areas were utilised as settings for collaborative or active work, or to gather tutorial groups or large cohorts for communal experiences. With ready access to a variety of settings, students and teachers were able to participate in a wide range of learning experiences—experiences that encompassed many of Gardener’s multiple intelligences (1993, 1999) and provided students with opportunities to explore their strengths and weakness across a range of learning modalities. The interconnected nature of these settings provided
students with the opportunity to shift between learning modalities without having to wait for access to an appropriate setting during a subsequent lesson. In these innovative learning environments a variety of pedagogical encounters was supported.

New socio-spatial contexts for learning emerged as purposeful settings became better integrated. Different settings mediated different forms of social interaction due to their structure and the types and arrangement of furniture items. However, it was the linking of these settings physically and socially, via new pedagogical approaches, that gave rise to a new social dynamic. The resulting flow of people, materials and information between purposeful settings meant that teachers and students were able to interact with each other in new ways to develop a variety of learning behaviours that were in keeping with contemporary middle years’ educational theory (refer to Chapter 2).

With the emergence of new socio-spatial contexts for learning, some of the physical and social barriers that had limited the development of new learning cultures began to break down. Adam (15/9/10), a teacher at Seaside SC, recognised this situation and suggested that the refurbishment of the Hub had created an opportunity to “exceed the usual limits of institutional reality”—an observation that could have applied equally to the situations at both Suburban HS and Inner City PS.

_Tensions associated with interactions between space and pedagogies_

As indicated in the previous chapter, school communities encountered early difficulties working in spaces that were designed to support movement between a variety of purposeful activity settings. This was especially true at Suburban HS and Seaside SC. The following example from Suburban HS illustrates these tensions.

In an attempt to alleviate foreseen early tensions between space and practice at Suburban HS, a decision was made to timetable zones within each SWiS building just prior to occupation. This was done to provide some predictability regarding which settings/spaces cohorts of students and teachers would have access to. Subsequently, this resulted in students and teachers being nominally restricted to certain areas, rather than being granted access to the variety of the settings housed within each SWiS building. When this decision was reviewed after nine months of occupation, school leaders acknowledged that providing access to settings on an as-needed basis would not have worked initially due to a lack of understanding among teachers regarding how to orchestrate such a situation. They suggested that the organisational structures that were needed to facilitate free-flowing activity between activity settings could only be developed over time. They remained optimistic, however, that a ‘complex’ educational system, characterised by non-linear relationships between social and physical agents, would be developed. They believed that such a system would enable students to work as largely self-directed learners on
individualised learning programs. They envisaged that teachers would fill multiple roles, including that of facilitator, guide, mentor and instructor, to support students in their learning. With respect to these notions, Associate Principal, Jennifer (28/1/10), at Suburban HS commented:

We are not at the full model yet. When the right groupings are in place, negotiations and movement will occur more freely and openly. At the moment we have people ‘whooshing’ here and there. It [development of the full model] will occur in a naturalistic and emergent way.

This pedagogical vision continued to raise concerns with some teachers at Suburban HS who were of the opinion that learning cohorts should continue to be restricted to certain settings/spaces during lessons. They believed that allocating areas to specific cohorts was important so that teacher-teams could gather student cohorts at the start and end of lessons to provide direction/instruction, maintain surveillance over students to ensure that they were ‘on-task’, locate students so they could monitor their progress through observation, interact with students to support them in their learning, and be able to predict which resources students would have access to.

However, these concerns were contradicted by the emergent practice of ‘invasion’ I observed at Suburban HS. ‘Invasion’, as termed by some of the teachers, involved members of learning cohorts taking over settings/spaces that had been timetabled for use by other cohorts. These events indicated that some teachers and students were not willing to accept the restrictions of timetabling arrangements on access to settings and resources. The resulting competition for both space and materials was observed to lead to some frustration amongst teachers, especially those who wished to maintain predictability regarding access to specific settings. ‘Invasion’ was not viewed by the school leaders as necessarily a bad thing. This emergent practice was aligned with their original design intentions and desired pedagogies. Therefore they encouraged teacher-teams to negotiate space swaps so that students could flow between settings in pursuit of learning experiences.

**New socio-spatial contexts for learning and curriculum integration**

New socio-spatial contexts for learning provided new opportunities for curriculum integration. Indeed, a number of teachers suggested that curriculum integration was more likely to occur in these new contexts than in traditional classrooms. Opportunities for curriculum integration appeared to be supported by the integration of diverse settings and by the new social dynamics that emerged within these settings.

Curriculum was not integrated as commonly as might have been expected, given these opportunities, nor as often as was desired by school leaders. Possible explanations for this in the high school settings may have been associated with the devotion of teachers to their favoured disciplines and with the externally mandated curriculum, assessment and reporting frameworks that teachers were obliged to follow—as
discussed in the previous chapter. In addition, the integration of curriculum appeared to be restricted by
issues associated with the management of learning resources. For example, staff at both Seaside SC and
Suburban HS struggled to provide resources for hands-on/craft activities in ‘wet area’ settings. The issue
of who was responsible for purchasing and managing these materials was observed to slow the
integration of curricula and the development of pedagogies that involved hands-on learning experiences.
Following the refurbishment of the Hub at Seaside SC, this tension was somewhat overcome by
allocating a willing art teacher to one of the teacher-teams. Her inclusion in the socio-spatial context not
only supported the resourcing of the wet area in the Hub, but also facilitated the expanded use of this
setting as a site for interdisciplinary learning.

Characterising the socio-pedagogical cultures that emerged within new socio-spatial
contexts for learning

Socio-pedagogical cultures and a sense of place

Culture was described by Jackson and Smith (1984) as a system of shared meanings that are dynamic
and negotiable. Further to this, they suggested that culture may have spatial qualities and be associated
with a sense of place.

In discussing this link between culture and place, Dovey (2008) suggested that most theories of ‘place’
stem from philosophy, social theory and geography, and are aligned with terms such as, ‘identity’,
‘community’, ‘character’ and ‘home’. However, he believed the common definition of place, as “a location
experienced as meaningful within a larger spatial context” (p. 45), was too narrow. His contention was
that “places frame and construct social programs and representational narratives, as they are framed and
constructed by them” (p. 45).

Informed by these theories about culture and place (Jackson & Smith, 1984; Dovey, 2008), I observed
new socio-pedagogical cultures emerge in the case study schools as teachers and students developed
new conceptions of place through their interactions with each other and with their physical surrounds.

The shared ownership of space, as discussed in Chapter Six, appeared to be a key factor in the
development of a sense of place. Students and teachers conceptions of place appeared to be more
readily cultivated at Inner City PS and Suburban HS than at Seaside SC, due to the longer periods of time
that they spent together in these environments. A sense of place appeared to be more elusive for
occupants of the Hub at Seaside SC due to the short and infrequent periods of time that they spent there.
High quality displays, such as those at Inner City PS which were created by both students and teachers, also appeared to enhance occupants’ sense of place.

*Emergent socio-pedagogical cultures*

Even amidst some of the ongoing tensions that existed in the case study schools, the new socio-pedagogical cultures that emerged were significantly different from those that had preceded them. School leaders reported that earlier cultures had been characterised by teacher-directed activities that provided students with limited choices regarding how they might engage in learning activities and interact with other students. They also reported that cultures had largely been defined by individual teachers and had differed between traditional classrooms. However, the socio-pedagogical cultures that emerged within the new socio-spatial contexts in the case study schools supported teachers and students in adopting new roles and identities.

As teachers employed constructivist pedagogies, they progressively abandoned enforcing rigid social expectations on students and allowed them to develop their own approaches to learning. In addition, team-teaching structures liberated teachers from traditional roles and allowed them to become more collaborative practitioners. This change in role enabled them to communicate with students more frequently as individuals, rather than as collectives. Thus the cultures that developed were increasingly accepting of student-directed learning and diverse activity.

Students formed new identities as they harnessed opportunities to become more self-reliant. Rather than wait for instructions from teachers, many students demonstrated increased initiative and independence. The majority of students relished their relative freedom. This was demonstrated through their behaviours and communicated to me by students during interviews. Many teachers also shared in this opinion. Assistant Principal, Clare, at Suburban HS (28/1/10) made the following comment:

> We have found that if the students feel comfortable in the environment they are in they settle down without rules and their work ethic improves. The students are now being treated and respected as individuals and seem to be emotionally settled and ready to learn. The relationship between students and teachers is much closer ... in each SWIS there is harmony. It is something to do with the groups of 50, the teams of teachers and the spaces.

Of course some students took the opportunity to ‘opt out’ and not consistently participate in learning activities. These evasive students required additional attention from teachers in order to keep them ‘on task’. Nevertheless, Clare’s (28/1/10) comment that “it is something to do with the groups of 50, the teams of teachers and the spaces” supported my contention that the emergence of new socio-pedagogical cultures in the case study schools was the result of complex and non-linear interactions between social
and physical components of the activity settings found in the schools, and provided further credence to the idea that these schools functioned as complex adaptive systems.

Over time, the emergent cultures supported an improved overall experience of school for students by enabling pedagogical innovation, facilitating constructivist learning opportunities, providing a cultural ‘situatedness’ that allowed students to develop meanings that were readily communicable with other people (Bruner, 1996) and ultimately supported students’ academic and social development. In addition, the majority of teachers suggested that their experiences of their workplaces also improved.

*New socio-pedagogical cultures, student behaviour and control*

A positive characteristic of the new socio-pedagogical cultures was that students were generally well behaved. At Inner City PS and Suburban HS this led to a pervading sense of calm, as students settled into learning activities without the need for teachers to use ‘standover tactics’ to control their behaviour. Allan (26/8/09), a teacher at Inner City PS, attributed improved student behaviour to the new social structures that had emerged following the refurbishment of the Year 5/6 area. He commented as follows:

> So instead of that kid being in the classroom where the teacher is telling him off half the time because he is a behavioural issue, he is actually in an environment where there are three teachers who are giving him support and guiding him through … it has a lot to do with the structure.

Assistant Principal, Clare, at Suburban HS (16/9/09) also suggested that student behaviour had improved in their new learning environments:

> We have the two most challenging Year 8 groups in the school. They were so challenging that we could hardly manage them in term one [prior to occupying the SWiS buildings]. But now that is not the case at all. Their behaviour has improved. They are the ones that we got the Minister [State Minister for Education] to walk through, and work with, when she visited.

Other school leaders at Suburban HS also attributed better student behaviour to new spatial configurations and improved student engagement. The Principal, Timothy (28/1/10), commented that although student behaviour remained an issue in the playground, there were almost no ‘trouble makers’ during lessons because the ‘captive audience’ whom kids had once ‘played up to’ no longer existed due to the new spatial arrangements in the SWiS buildings. Further to this, Assistant Principal, Clare (16/9/09), suggested that teachers did not have to spend as much time trying to ‘control’ students because more students were engaged more of the time. She went on to say that, “the fear was that as soon as you let them out of that little box your ability to control that behaviour and modify that behaviour might be reduced, but it hasn't been at all”.
Almost certainly, the new socio-pedagogical cultures at Inner City PS and Suburban HS contributed to the improved behaviour of the students at those schools. At Seaside SC, however, a sense of place and a new culture was difficult to cultivate in the Hub because students were rarely there – as discussed previously. Students at Seaside SC spent the majority of each school day in traditional classrooms and only attended lessons in the Hub for two or three 50 minute periods per week. Therefore, students found it difficult to make the transition between traditional classroom cultures and the Hub—which at times manifested in the form of inappropriate behaviours. During a post-refurbishment focus group forum (15/9/10), teachers discussed this problem and suggested that many students required high levels of teacher direction during their first few lessons in the Hub. These teachers were of the opinion, however, that as students spent more time in the Hub they ‘got used to it’ and settled into learning more readily.

It appeared that the new socio-pedagogical cultures that emerged in the case study schools – particularly at Suburban HS and Inner City PS, and to a lesser extent in the Hub at Seaside SC – acted as overarching ‘control measures’ to guide student participation in constructivist learning experiences. The ‘complex’ education systems that evolved were framed by new physical, pedagogical and temporal arrangements and exhibited self-organizing properties. The overall influence of these emergent cultures was that they supported improved student engagement and student behaviour – which I discuss in the following section.

Emergent behaviours and student engagement

In this section I discuss the influences that innovative learning environments and constructivist pedagogies had on the behaviours of students, especially those associated with student engagement. As cause and effect relationships can be difficult to identify in complex systems, I qualify these findings by saying that student engagement was influenced by many interactions between many agents – only a few of which I was able to identify. This perspective is in keeping with Fredericks et al.’s (2004, p. 59) description of student engagement as a multidimensional construct that is “malleable, responsive to contextual features, and amenable to environmental change”.

Here, I describe the signs of observed student engagement that I believed were associated with particular activities and learning experiences. In addition, I report on the perspectives of students and teachers regarding student engagement. As I discussed in the previous section, the socio-spatial contexts and socio-pedagogical cultures that co-evolved in the case study schools were found to positively influence student engagement.
A holistic view of what may influence student engagement was aligned with the findings of Connell (1990), Eccles and Midgley (1989) and Skinner and Belmont (1993), each of whom found that interactions between individuals’ needs and contexts either promoted or undermined engagement. So although context and culture were considered to be the most significant influences on student engagement, my objective in this section is to describe how a select few agents interacted to influence the engagement of students in constructivist learning activities.

**Signs of student engagement**

As cited in Chapter 2, Fredricks et al. (2004) identified three engagement subtypes: behavioural engagement, emotional engagement and cognitive engagement. They described each of these as follows:

- **Behavioural engagement** draws on the idea of participation; it includes involvement in academic and social or extracurricular activities and is considered crucial for achieving positive academic outcomes and preventing dropping out.

- **Emotional engagement** encompasses positive and negative reactions to teachers, classmates, academics, and school and is presumed to create ties to an institution and influence willingness to do the work.

- **Cognitive engagement** draws on the idea of investment; it incorporates thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills (Fredricks, Blumenfeld & Paris, 2004, p. 60).

Following 15 months of regular observation of students in the case study schools, I concluded that body language was a useful indicator of student engagement. Body language provided evidence of students’ willingness to participate in learning activities (behavioural engagement), revealed their reactions to teachers, classmates and events (emotional engagement) and exposed their readiness to exert effort to master difficult concepts or skills (cognitive engagement).

**Observations of small group activities**

Observation of collaborative small group activities revealed that students who sat with their heads close together, looking at and discussing common learning materials, were highly engaged, while those who sat even a small distance apart, perhaps just leaning back on their chairs, were less engaged. These less engaged students demonstrated little interest in looking at or discussing common learning materials.

Researchers who have studied student interaction and dialogue in small group settings have reported similar findings (e.g. Wilks, 2005). Webb (1982) suggested that student interaction was influenced by
characteristics of the individual, group and setting, and indentified an individual’s role in group interaction as an important influence on learning. Lodge (2005) described dialogue as a vehicle for engagement and suggested that student engagement was often expressed in excitement, raised energy levels, and physical proximity. Olitsky (2007) reported that coordination of students’ movements and gaze direction was correlated with mutual focus, while a lack of coordination, such as pauses, hesitation, and asynchronous movement, indicated a lack of (emotional) engagement. Olitsky based her research approach on the work of Collins (2004), who suggested that interactions that contributed to group membership were based on people’s tendencies to maximise emotional energy. Collins described group membership as being generated by bodily co-presence, mutual focus, common mood, boundaries to outsiders, coordination of body movements and speech, shared experience at an emotional and cognitive level, and solidarity with others present.

Researchers, including Bresler (2004), Ellsworth (2005), Smithrim and Upitis (2005) and Upitis (2010), have also indentified connections between the physical dimensions of learning experiences and student engagement. Ellsworth (2005) suggested that these connections between the material world and learning experiences have historically been neglected by educators. Regarding what might be termed ‘physical engagement’, Ellsworth (2005, p. 24) suggested that “pedagogy is seldom engaged as an event in which the materiality of a time and place of learning impinges on the materiality of the learning”. In expanding on these notions, Ellsworth (2005) asked:

What might become possible and thinkable if we were to take pedagogy to be sensational? What if, as educators, we began to consider pedagogy to be a time and space designed to assemble “with the bodies [of learners] in a web of inter-relational flows in material ways” (Kennedy, 2003, p. 26) (p. 26)?

Observation also revealed that incidental physical contact between students was correlated with high levels of engagement. The incidental physical contract that I refer to often occurred in situations when students sat close together on the floor or on soft furniture items, such as ottomans or padded bench seats. I concluded that communication via physical contact was associated with students feeling a sense of belonging, trust, safety, and togetherness. I observed that students who sat right next to one another focused on learning tasks for long periods of time. Rather than leading to distraction, it seemed that sitting in close proximity (even touching) supported high levels of engagement in activities that required reflective thinking. In these situations, students often talked less than in other collaborative situations and produced significant amounts of work. These findings were in agreement with those of Johnson, (1981. P. 9) who argued that “for student-student interaction to have a constructive impact on learning, it must be characterized by acceptance, support and liking”. He warned that physical proximity between students does not automatically lead to constructive influences on students’ achievement, socialisation or development.
As the proximity between students was often mediated by furniture items, these findings had spatial implications. In Chapter Six, I outlined one example of this when discussing the influences that table shapes, sizes and arrangements had of the social relationships between students. I concluded that furniture items that enabled students to sit close together supported deeper engagement in collaborative group activities and also supported students to engage in individual tasks.

Observation also indicated that small collaborative groups operated better when there was some distance between groups (i.e. groups were dispersed across learning environments). It appeared that although high student density was desirable within groups, it was not desirable between groups. Some distance between collaborative groups appeared to have a calming effect that allowed students to stay focused and involved in the activities of their group. These findings aligned with those of Weinstein (1979), who found that high levels of student density across open plan learning environments was associated with dissatisfaction, decreased social interaction, and increased aggression on the part of students.

**Observations of teacher led activities**

Higher levels of engagement were observed when tutorial or discussion groups were limited to 15-17 students, as such numbers generally allowed students and teachers to sit facing each other. When arranged in circles or semi-circles, the proximity between students in groups of this size was found to be close enough for them to feel part of a functioning unit.

When students were gathered in larger groups, these functioning units tended to break down – especially when teachers gathered student cohorts of 50-75 and attempted to engage them in discussions for more than a few minutes. Even groups of 25 students appeared to be too big to support the engagement of all students. I observed that students who were not able to sit within gatherings of 25 students, and were therefore not able to face the other members of the group, tended to look around the room for other stimuli. At Inner City PS, for example, students sitting three rows back from the front of mentor group discussions (25 students) appeared to find it difficult to engage in these group activities due to their geographic position. In contrast, students who sat towards the front of these gatherings, and thus gained membership to a more intimate setting, demonstrated higher levels of engagement, evidenced by their attentive listening and participation in discussions. In these situations, it is possible that students ‘self-selected’ where they sat and those who were less interested chose to sit towards the back. However, this did not appear to be the case as the same students often sat in different locations. In support of these observations, students made the following comments:

> In a smaller group we get more say. If there are 75 kids you won’t get to choose really what you want. But if it is a smaller group you get more say about what to do … I like it when it is not too big (Rowan, Inner City PS student, 15/12/09).
When we divide into smaller groups, we can better understand what we are supposed to be doing (Shanti, Suburban HS student, 29/10/09).

Based on these observations, I concluded that the duration of teacher led activities and the number of students in a gathering had an inverse relationship with regard to student engagement. It seemed that the longer a discussion/activity went on, the smaller the group size needed to be for the discussion/activity to be productive. The key factor that appeared to influence this relationship was the need for face-to-face contact between group members. This was especially important for discussions of longer duration. I observed that as the environmental competency (Lackney, 2008; Steel, 1980) of teachers improved, they began to make informed decisions about what group sizes were best suited to particular activities. For example, more intimate conversations involving discourse between teachers and students were conducted in mid-sized groups of 12-25, while whole cohort meetings for 50-75 students were generally kept to shorter durations. Ideally, these mid-sized groups would have been capped at 15-17 students, yet staffing numbers often meant that groups needed to be larger.

**Students’ geographic experiences and student engagement**

The geographic experiences that were afforded by the innovative learning environments in the case study schools appeared to have a positive influence on the engagement of the majority of students. The buildings mediated social settings in which most students felt comfortable and the majority of students appeared to be more engaged when able to move and inhabit settings as they wished. In contrast, students who were required to sit at specified desks during some lessons often demonstrated a lack of engagement through body language which included lying their heads and torsos across desks to avoid participating in activities. Lakshmi (29/10/09), a student at Suburban HS made the following comment: “people get more sidetracked and a lot more bored in classrooms, but here [in the innovative spaces] you have the urge to learn”. Certainly, the provision of access to a variety of settings appeared to have a calming influence on students and also appeared to alleviate feelings of entrapment that some students experienced within traditional classroom settings.

The relative geographic freedom that students experienced in these spaces appeared to not only support their physical transition between learning activities, but also their mental transition between activities. For example, I noted the relative ease with which the students and teachers at Inner City PS were able to move throughout their innovative learning environment and transition between activities. In one instance, a teacher took his mentor group (25 students) outside for ten minutes prior to coming back inside for the last five minutes of the day. Upon their return, the students were able to come in, sit down and start a
conversation within one minute, which I considered to be exceptionally fast for a group of Year 5/6 students to congregate and focus on a discussion.

Students at both Inner City PS and Suburban HS demonstrated positive emotional engagement with school and with their innovative learning environments through their desire to stay inside during recess, lunchtime and even after school. This phenomenon was not observed at Seaside SC—probably due to the pervading culture in the school that saw traditional classrooms vacated at the end of each lesson.

At Suburban HS, students demonstrated their liking of the new spaces by their desire to ‘hang out’ in them, although they were usually ushered outside by teachers because only outside areas were officially supervised during breaks. Even after school on Friday afternoons students at Suburban HS were keen to stay inside and talk with their friends.

At Inner City PS, students regularly demonstrated their emotional engagement with school by continuing discussions and collaborative activities after the school bell rang at the end of the day. On a number of occasions I observed teachers bringing group discussions to a close 5 minutes after the bell. The transitions between lesson times and lunch or recess times at Inner City PS were also ‘blurred’.

Regularly, there was no distinguished stop work instruction from the teachers. At the bell, students often finished their conversations/activities in their own time before moving to their lockers to stow their belongings and get their food. With regard to the high levels of student engagement at Inner City PS, Craig (26/8/09), a teacher at the school, made the following comment:

All indications are that our kids are engaged, the parent feedback is that the kids haven’t ever been happier at school, the vast majority of them … there is no one in here that is just dumping their head on the table going, you know this is boring … I think it has been contained really well, particularly compared to other times at the school [in the past], where we had big problems with the Year 6s acting up and getting bored over the last six months [of the school year], thinking it is a waste of time.

Enabling students to participate in a range of pedagogical encounters within the same overall learning environment was found to support their engagement. High levels of engagement were supported by: opportunities for students to engage in a range of diverse activities, opportunities for flexible group arrangements that offered students regular transition between working on their own and as members of groups, and access to a variety of learning materials and resources. These findings corroborated with those reported by Weinstein (1979) regarding the influences that 1970s open plan schools had on students’ behaviours and attitudes. She identified connections between more ‘humane’ spaces and better attendance, greater participation, and more positive attitudes towards the class, the instructor, and classmates.
Gender specific learning styles, geographic experiences and student engagement

Generally, girls appeared to handle the geographic freedom afforded by innovative learning environments a little better than boys and engaged in self-directed learning more readily than boys. Some boys found it difficult to settle into learning activities when asked to be self-directed and wandered about until provided with more precise instructions from teachers. Upon observing this, I began to wonder if innovative learning environments were better suited to girls than boys.

Observation of boys within traditional classroom settings at Suburban SC and Seaside SC, however, revealed that some boys had just as much, if not more, difficulty engaging in learning activities in controlled environments as they did in more informal innovative spaces. On a number of occasions, boys actively resisted doing work in traditional classrooms and engaged in disruptive behaviour. Such behaviours were observed less frequently in innovative environments. The fact that these boys did not actively resist doing work in innovative environments, or generate conflict between themselves and their teachers, seemed to indicate that they were somewhat emotionally engaged, if not consistently behaviorally or cognitively engaged, when working in innovative environments.

The literature about gender specific learning styles indicates that the preferred learning styles of girls and boys differ (Restak, 1979; Marcus, 1979; Jorge, 1990; Yong & McIntyre, 1992; Lo, 1994; Pengiran-Jadid, 1998; Honigsfeld & Dunn, 2003). Although precisely how they differ appears to be somewhat contested. For example, Jorge (1990) suggested that boys need more structure to engage with difficult subject matter, while Yong and McIntyre (1992) suggested that informal learning environments that promote active learning and mobility appeal more to boys than girls. On the other hand, there is some consensus that boys prefer kinesthetic learning (Restak, 1979; Pengiran-Jadid, 1998; Honigsfeld & Dunn, 2003) while girls are more inclined to be responsible and conforming (Marcus 1979; Lo, 1994; Honigsfeld, 2001). As a cautionary note, Honigsfeld and Dunn (2003) identified that such generalizations do not necessarily represent the preferred learning styles of individuals.

Within the domain of architecture, Rendell, Penner and Borden (2000) identified issues associated with connections between gender and space. They suggested that “architecture is constituted through its occupation, and that experiential aspects of the occupation of architecture are important in the construction of identity” (Rendell, Penner & Borden, 2000, p. 10). They therefore identified the social production of architecture as being entwined with feminist concerns and issues of gender.

These findings indicate that further research about how innovative learning environments may favour girls or boys may be required.
Constructivist learning and student engagement

The new socio-pedagogical cultures that emerged in the case study schools provided opportunities for students to move beyond learning experiences that were primarily directed by teachers to participate in constructivist learning activities (Strommen & Lincoln, 1992). These opportunities allowed students to show initiative and take ownership of their learning—a situation they appeared to relish. Daniel (29/9/09), a student at Suburban HS, made the following comment in relation to an opportunity that he and his peers were given to pursue a project of their choosing:

During immersion week we had to make a product that was environmentally friendly. We could either make it or draw it and we actually made it. We made a solar panel charger … I got to work with my friends and we made this, like, huge model that actually worked.

Assistant principal, Clare (16/9/09), at Suburban HS also commented on this situation. She recalled a conversation a female colleague had with students in which they expressed their desire to have ownership and control over their learning:

She asked them, ‘do you like doing this project?’, and they all said ‘oh we love it’. And she said, ‘why do you love it kids’? And they said, ‘because we are in control … and it is great because we can do what we want, when we want to do it and we can move around and this is really fun’. And one of them said, ‘we know it is English and stuff but you wouldn't think so. English is good because you get to do other stuff, so you don't realise that you are learning even when you are’.

Clare (16/9/09) hoped that the engagement frequently exhibited by students during immersion weeks would be expanded across a broader program. She suggested that learning outcomes improved when students were given the opportunity to work in small collaborative groups across a variety of settings: especially when provided with complicated tasks which required them to make decisions about where and how they might carry out particular activities. She suggested that in the long term “we want to move towards inquiry-based self-directed projects”. She also revealed a desire for such projects to incorporate opportunities for authentic learning (Newmann, 1992; Newmann, Marks & Gamoran, 1996), the use of ICT and improved connectedness between learning domains. Such comments revealed the school leaderships’ intentions to pursue a pedagogical approach with strong parallels to critical pedagogy (Freire, 1970 & 1973; Giroux, 1985; Giroux & Schmidt, 2004; Apple, 1995; McLaren, 1998 & 2007) and to make learning more relevant to the world beyond school.

Teachers at both Inner City PS and Seaside SC also reported that student engagement was higher when students were provided with opportunities to work on constructivist, project-based activities that enabled them to work individually or in small groups on multiple aspects of a task, across a variety of activity
settings. Dani (14/5/09), a teacher at Seaside SC, reported that when students were provided with such opportunities they became more engaged than she had ever seen them. She said that she knew they were engaged because they were self-directed and only coming to her to ask questions that supported their participation in the tasks at hand. Similarly, Allan and Craig (26/8/09), both teachers at Inner City PS, reported that student engagement was highest when students were working on complicated tasks that required them to make multiple collective decisions about how to perform them, where they should perform them and which tools they should use. They suggested that intermittent conversation between students was essential if they were to engage deeply in what they were doing. This illustrated the importance of social constructivism in the learning situation. Allan (26/8/09) described the engagement of students at Inner City PS when making choices about which pieces of work they should put in their portfolios:

"It's about students being concentrated on the task. Totally on task—going through, looking at their work, making judgements about the work, talking to their mates and saying, 'what you think about this piece of work'? ... Can you read that for me? Do you think I have learnt about paragraphs in that? ... For me it (quality student engagement) looks like, kids at computers working on their own, kids at computers working with a friend, kids sharing, kids working individually, kids focused on their learning and thinking about their learning. Finishing tasks because they want to complete aspects of their learning, or they want to show their learning. And it's not just to prove it to the teacher or to get a mark. It is so they can say, 'I am putting this in my portfolio because I really want to show you that this is what I have learned, and that I have been engaged in this task'... It is not about getting A,B,C, 9/10 or 8/10 (marks). It is actually about showing learning."

Interaction with teachers and student engagement

Student engagement was supported by team teaching arrangements. Individual teachers were able to take on a number of different roles and spend significant amounts of time with those students who required additional support, while other teachers moved around to attend to the needs of those students who required less teacher direction. To this end, Craig (26/8/09), a teacher at Inner City PS, suggested that students were happy to have access to a number of teachers during lessons. He reported that, "we have had feedback, direct feedback from students and parents, telling us that they really enjoy having more than one teacher". Daniel (29/10/09), a student at Suburban HS commented:

"Since we have three teachers and fifty students now, even if we didn't pay attention to one teacher we can always ask another teacher instead of constantly asking the same teacher. So if we can't understand something and the teacher is busy, we can ask another teacher ... there is always someone you can ask if you are having difficulty ... if I were really having a problem I would ask my preferred teacher."
It was acknowledged by teachers and school leaders that collective efficacy within teacher teams was important to ensure that students did not ‘slip between the cracks’ and avoid participating in learning activities. Nevertheless, a few students still managed to avoid ‘doing the work’ by quietly moving to remote areas of learning environments, beyond the clear view of teachers. Allan, a teacher at Inner City PS, suggested that these students could be a little difficult to keep track of. However, he was of the opinion that once the new education model at Inner City PS became better established they would be better equipped to ensure the needs of all students were addressed. In keeping with Allan's opinion, the collective efficacy within teacher teams appeared to improve as teachers became more comfortable in new socio-spatial contexts, gained experience working together, and moved from developing new practices to refining newly established practices.

For those students with initiative and a sound work ethic these new socio-pedagogical cultures appeared to work well. For others, having minimum overt pressure put on them to participate in specific learning activities meant that they sometimes ‘slipped by’ without doing much. Certainly students were more engaged when they understood what they were supposed to be doing. To this end, Steff (29/10/09), a student at Suburban HS, commented:

We can make it a bit more organised. Right now, it's organised but it can sometimes fall out of place a bit. The teachers do a good job, they do keep it all together, but it's up to the students if they want to listen to the teachers or if they want to muck around … Sometimes you can feel a bit lost. Even if you do ask a teacher for direction, and they give you direction, you can feel a bit confused by this new type of learning … I like to have the teachers tell me what to do. Taking responsibility for yourself takes more effort.

**ICT and student engagement**

The resource that really enabled students to maintain high levels of engagement while working with some independence from teachers was ICT. Near ubiquitous access to ICT enabled students to frequently transition between physical and virtual/digital media. Students at Suburban HS and Inner City PS had access to desktop computers from their first day in their new learning environments. Access to ICT at Seaside SC was supported by net-book computers, which were purchased towards the end of the fieldwork phase of this study. Suburban HS also purchased net-book computers just prior to the completion of fieldwork at the school.

This did not mean that students used computers all the time. In general, students did not appear to be any more or less engaged in tasks when using pen and paper or computers, if they could transition between these media as required. This finding ratified Thompson’s (2005) conclusion that ICT rich
learning environments should be designed to include technology-free spaces where students could plan computer aided tasks prior to commencing work at the computer.

Teachers across the case study schools identified that consistent access to ICT enabled students to work well on their own, even when other students were working within close proximity. This observation indicated that ICT supported student engagement in individual activities. In addition, I observed students working well in pairs on computers. Such collaborative efforts often supported rich dialogue between students. This aided their engagement in academic tasks and supported knowledge transfer between students regarding the use of computers and online resources. Of course some students abused their relative freedom and played online computer games, however such behaviour was observed infrequently.

Access to online information and a variety of presentation media supported students to engage in constructivist inquiry-based projects. For example, two boys at Suburban HS created a song with lyrics and music using an online song-writing program to communicate their understandings associated with a history project about Mayan culture (their choice of civilisation). They discovered the program themselves, and as it was accessible from home, both students were able to work on the project at school and in their respective homes. This example demonstrated how the boundaries between school and home could be overcome with the use of online resources, and how student engagement could be enhanced through self-directed and collaborative activities that were supported by ICT.

This example, and others, aligned well with Monahan's (2005) conclusions that technologies can operate as extensions of space, and computers can reinforce or challenge traditional expectations about spatial arrangements and pedagogical practices. Furthermore, emergent practices such as those observed aligned well with Skill and Young's (2002) opinion that well designed integrated, or hybrid, learning environments could accommodate diverse learning experiences that “embrace, empower and sustain learners of differing capabilities and interests” (p. 24).

Practices that began to emerge in the case study schools towards the end of the fieldwork phase of the study indicated that new social constructs were being developed with the aid of new technologies. Such developments demonstrated the propensity of the case study school communities to move away from traditional structures, including those that Mioduser et al. (2003) identified as often mitigating attempts to effectively implement technological change in schools.

I observed that the adoption of new digital technologies occurred via ‘complex’ processes that involved learning environments, pedagogies, students and teachers. These observations were in keeping with those of Cuban et al. (2001), who identified similar processes as 'complicated'. My observations suggested that the emergence of hybrid learning environments (Skill & Young, 2002; Weiss, 2007)
followed a non-linear path that involved both students and teachers contributing to the development of new pedagogical practices and the creation of connections between people, environment and technology. Certainly, the emergence of hybrid learning environments was associated with contemporary ideas about pedagogy, integrated curricula, individualisation of learning, learning through cooperative group work and a focus on higher-order thinking (Zandvliet & Fraser, 2004). In addition, the new practices that began to emerge went some way to meeting Weiss’s (2007) call for pedagogical models that could take advantage of hybrid learning environments. The emergent practices showed that in-class (physical) and out-of-class (virtual/online) activities could be integrated, and that these learning experiences could be highly engaging.

**The overall effectiveness of innovative learning environments**

In this section I address the following subsidiary research question: *How can the effectiveness of innovative middle years learning environments be assessed for their influence on pedagogical practices and student engagement?* I discuss methods of determining the effectiveness of learning environments and discuss how effective the learning environments in the case study schools were.

**Developing effective learning environments through participatory action research**

The participatory action research (PAR) methodology that was central to this research explored the development of space and practice in the case study schools. At Suburban HS and Inner City PS, the PAR focused mainly on how innovative learning environments could be used to support the development of new pedagogical models. At Seaside SC, the PAR developed into an educational visioning and spatial design project, following the school’s decision to update the physical environment in the Hub. Across the case study sites, the common theme that was revealed via the PAR process was that the effectiveness of innovative learning environments was primarily a function of how well space and practice aligned.

**The effectiveness of innovative learning environments: a matter of alignment**

This research revealed that the effectiveness of innovative learning environments is primarily associated with how well particular pedagogies, curricula, assessment practices, and social factors are supported by, or aligned with, particular environments. With regard to constructivist pedagogies, the effectiveness of innovative learning environments was found to be associated with the ways dynamic ‘complex’ interactions were supported by particular spaces.
Gaining insight into the educational visions, or philosophies, behind spatial designs was found to be essential for evaluating the effectiveness of innovative learning environments. For example I witnessed some visitors to Suburban HS, who were not privy to the schools’ objectives, report negative reactions to the design of the SWiS buildings. They suggested that the learning environments were too busy, too noisy and provided too little containment for the delivery of a high quality education. However, once new pedagogical practices were given a chance to emerge, the new learning environments performed well when examined through the lens of the schools’ educational vision. Indeed, many of schools’ spatio-pedagogical objectives were met within the first year of occupation. The new spaces enabled team-teaching approaches, catalysed the adoption of constructivist pedagogies, facilitated social connectedness within learning communities, supported collaboration between students and between students and teachers, and provided opportunities for students to pursue personalised learning goals through inquiry, project-based and problem-based learning models.

I believe it is important to seek the opinions of occupants when assessing the effectiveness of innovative learning environments. As ‘effectiveness’ is a function of the complex social and physical interactions that occur in these environments, it is essential that people who have experienced these places are involved in evaluating them. For example, at Inner City PS the effectiveness of the refurbished Year 5/6 learning environment was confirmed by the fact that this spatio-pedagogical model was used to inform the redevelopment of the rest of the school—to be completed with funds provided by the federal government’s Building the Education Revolution scheme (DEEWR, 2009). The acceptance of this model by the school community demonstrated the effectiveness of the spatio-pedagogical reforms in Year 5/6. Supporting this conclusion, Allan (26/8/09), a teacher at the school, suggested that refurbishment of the Year 5/6 environment had enabled learning opportunities that could not have been provided in single classrooms. His colleague, Craig (26/8/09), commented favourably about the educational possibilities that had been provided by the new spaces:

In theory you could do everything we are doing if traditional classrooms were located next to each other, but there would be a massive problem … there is a lot of movement. Getting all these kids in and out of tiny little doors would be crazy. We have got these big, large doors and we can flow [between spaces]. And the other thing is that we are constantly communicating with each other—the teachers are, and the students are … we are constantly updating each other mid-lesson.

Furthermore, it was found that the effectiveness of innovative learning environments was closely related to how well collaborative socio-pedagogical cultures could be supported by physical surrounds. At Inner City PS, for example, the effectiveness of the Year 5/6 learning environment was demonstrated on two occasions when I observed the spaces in use when two of the three regular teachers were away. With only one regular teacher and two casual relief teachers, the continuity of the educational program was
hardly disrupted. The sole regular teacher was aware of the day's schedule for all 75 students and did not need to change any of the day's activities. Indeed, the casual relief teachers were sparingly required as the students were able to pursue self-directed activities that required only infrequent input from the teachers. The team-teaching structures that had been put in place negated any potential disruption to the students learning that may have occurred due to the absence of the teachers. The effectiveness of the learning environment was associated with the socio-pedagogical dynamics that had emerged within this environment: dynamics that had been enabled by the spatial design and developed through regular discussions between teachers and students about how people should interact and use their environment to support learning. Allan (26/8/09), a teacher at Inner City PS commented:

I think that another very, very, very, powerful part of it is the student voice and the learning partnership. So from day one … the three of us talked with our kids, and the language has always been, ‘the team’ … We are all responsible for what happens in here in terms of learning. We are all responsible for our own learning and we are all equally responsible for each other's learning. So that notion of the team, of sharing, of working together, of shared responsibility, as well as individual responsibility, founded on values, trust and respect [is important] … I think, you couldn't have done it as powerfully in an individual classroom as you can do it in a collective sense because the teachers are modelling it. The teachers are living every minute of the day and so therefore the culture is a living, breathing, vibrant thing.

Although the effect of spatio-pedagogical reforms on students' academic outcomes was beyond the scope of this research, the positive influences of the spatial and pedagogical reforms implemented in the case study schools was confirmed by the words and actions of the teachers and students.

Evaluating the effectiveness of learning environments through direct associations with measures of student achievement neglects the myriad factors that can influence student engagement and learning outcomes. Evaluations of learning environments should take into consideration the complex interactions that occur between social and physical agents in the learning situation in order to seek understandings of the socio-pedagogical cultures that are supported by particular environments.

*The alignment of space and practice and the 1970s open plan school experience*

The findings that I have reported here are in keeping with earlier research findings regarding the effectiveness of open plan schools during 1970s. As I outlined in Chapter Two, a number of researchers reported that the effectiveness of ‘progressive’ learning environments was associated with matching space with educational practice (Brogden, 2007; Gump, 1980; Rodwell, 1998). Additionally, some of the same researchers concluded that learning environments became ineffective when teaching methodologies did not keep pace with architectural innovation (Brogden, 2007; Rodwell, 1998).
Conclusion

In the conclusion to this chapter I consolidate the findings related to the two subsidiary research questions identified in the chapter’s introduction: How are innovative learning environments and contemporary constructivist pedagogies collectively influencing socio-pedagogical cultures in the middle years, and what impact is this having on student engagement?, and How can the effectiveness of innovative middle years learning environments be assessed for their influence on pedagogical practices and student engagement? In addressing these questions, I build on the discourse that was initiated by Upitis (2004) regarding the connections between complexity theory, educational practices and school architecture.

Conducting this research through the lens of complexity theory facilitated a holistic view of phenomena. As discussed previously, complexity theory offered an intrinsically subjective (Heylighen, Cilliers & Gershenson, 2007) perspective on the settings in the case study schools; a perspective that dealt with uncertainty, connectedness, self-organisation, emergence over time, and development through adaptation and change (Cohen, Manion & Morrison, 2007). This perspective allowed societal, community, individual, and institutional change to be recognised (Cohen, Manion & Morrison, 2007). It also enabled multiple perspectives and multiple effects to be simultaneously chartered, including the influences that physical environments and pedagogies had on socio-pedagogical cultures and student engagement.

The emergence of new socio-spatial contexts and socio-pedagogical cultures

Observation, interviews and PAR revealed that innovative learning environments and contemporary constructivist pedagogical practices interacted to create new socio-spatial contexts for learning. These new contexts for learning supported the flow of people, materials and information between purposeful activity settings and enabled teachers and students to develop a variety of new learning behaviours that were in keeping with contemporary middle years’ educational theory (see Chapter 2). Subsequently, new socio-pedagogical cultures emerged through complex and non-linear interactions between the social and physical components of these socio-spatial contexts. Framed by new physical, pedagogical and temporal arrangements, these socio-pedagogical cultures frequently exhibited self-organizing properties and often acted as overarching ‘control measures’ to guide student participation in constructivist learning experiences.

Student engagement in emergent socio-spatial contexts and socio-pedagogical cultures

The socio-spatial contexts and socio-pedagogical cultures that co-evolved and mutually adapted in the case study schools were observed to have a positive overall influence on student engagement.
Engagement was supported by opportunities for students to engage in diverse activities, flexible group arrangements that allowed them to transition between working on their own and as members of groups, and access to a variety of learning materials and resources.

Learning opportunities allowed students to show initiative and take ownership of their environment and subsequently their learning. Students were highly engaged when working on constructivist, project-based activities that enabled them to work individually or in small groups on multiple aspects of a task, across a variety of activity settings. The relative geographic freedom that students experienced appeared to support their physical transition between learning activities, as well as their mental transition between activities.

During activities, intermittent conversation between students appeared to assist them engage deeply in what they were doing, illustrating the importance of social constructivism in the learning situation. Some students (a minority) found that having little overt pressure on them to participate in specific learning activities meant that it was difficult to get started on a task or remain engaged in an activity.

Student engagement was supported by team teaching arrangements. In particular, engagement was supported by the fact that individual teachers could spend significant amounts of time with those students who required additional support, while other teachers were able to move around to attend to the needs of other students. Collective efficacy within teacher teams was important to ensure that students did not ‘slip between the cracks’ and avoid participating in learning activities. Collaboration between teachers appeared to improve as teachers became more comfortable working within new socio-spatial contexts and gained vital experience working together. In situations where both teachers and students recognised their ‘collective responsibility’ and their role as part of ‘the team’, the ensuing democratic socio-pedagogical cultures that emerged had a pronounced positive influence of student engagement.

Body language was found to be a useful indicator of student engagement. In general, students who sat close together were more engaged in collaborative tasks than those who sat further apart. Close proximity between students also appeared to support students to engage in individual activities. These findings had spatial implications, as the proximity between students was often mediated by furniture items. While high student density appeared to be desirable within groups, it was not desirable between groups. The engagement of students within a group was found to be best when collaborative groups were separated by some distance.

The duration of teacher-led activities and the number of students in a gathering had an inverse relationship to student engagement. It seemed that the longer a discussion/activity went on, the smaller the group size needed to be for the discussion/activity to be productive. Higher levels of engagement
were observed when tutorial or discussion groups were limited to 15-17 students. This number generally enabled students and teachers to sit facing each other.

Access to ICT enhanced student engagement when students were required to work independently of teachers. Access to online information and a variety of presentation media supported students as they engaged in constructivist inquiry-based projects, enabled them to frequently transition between physical and virtual/digital media, and helped break down boundaries between learning at school and at home.

Investigation into the use of ICT by students revealed that new social constructs were developed with the aid of new technologies. In agreement with the findings of Zandvliet and Fraser (2004), the emergence of hybrid learning environments was found to be associated with contemporary ideas about pedagogy, integrated curricula, individualisation of learning and learning through collaboration. In addition, non-linear interactions between people, environments and technology contributed to the emergence of hybrid learning environments and the development of new pedagogies. These emergent practices demonstrated that in-class (physical) and out-of-class (virtual/online) activities could be integrated and that these learning experiences could be highly engaging.

The effectiveness of the innovative learning environments in the case study schools

The ideas contained in the following quote proved to be useful when discussing the effectiveness of the innovative learning environments in the case study schools. Heylighen, Cilliers and Gershenson (2007, p. 11) wrote:

> What distinguishes complexity science is its focus on phenomena that are characterized neither by order ..., nor by disorder ..., but that are situated somewhere in between ... In a truly complex system ... components are to some degree independent, and thus autonomous in their behaviour, while undergoing various direct and indirect interactions. This makes the global behaviour of the system very difficult to predict, although it is not random.

In keeping with these concepts, the socio-pedagogical cultures that best supported constructivist pedagogies and student engagement were characterised neither by social order, nor disorder, but by social dynamics that were ‘situated somewhere in between’. Indeed, these environments functioned best when students (social components of these complex systems) were to some degree independent and autonomous in their behaviour, while undergoing direct and indirect interactions with their environment, technologies, peers and teachers. Based on these findings, I concluded that the effectiveness of these innovative learning environments was associated with how well they supported complex interactions. Furthermore, their effectiveness was a product of how well particular pedagogies, curricula, assessment practices and social factors were aligned with these environments.
Assessing the educational effectiveness of other learning environments

If innovative learning environments are to be assessed for the ways they support contemporary constructivist pedagogies and student engagement, they must be assessed within the context of the educational systems that they are intended to support. Therefore, subjective assessments that are based on the opinions of people who have experienced the complex physical and social interactions that occur in these settings are required. In other words, the effectiveness of a learning environment cannot be assessed objectively, or in isolation from the educational program that it is intended to support. In keeping with this conclusion, insight into the educational visions behind spatial designs is required for the effectiveness of innovative environments to be properly assessed.

The role of innovative architecture in a complex adaptive system of education

Most schools and schooling systems internationally may be considered to be institutions governed by negative feedback loops. This means that schools and their supporting agents are often highly resistant to change and don’t deal well with turbulence or shocks to the system: the majority try to maintain the homeostatic nature of the system in preference to making adjustments to adapt the system to new circumstances. In the increasingly globalised world of the 21st century, rapid change has become the norm and schooling systems need to learn how to make regular adjustments if they are to remain relevant to students and the needs of society. Complex adaptive systems of education are required that can respond not only to the needs of individuals, but equally to the broader needs of school communities and wider society.

Innovative architecture can enable middle schools to function as complex adaptive systems and self-organise to cope with a variety of pressures and disturbances. Replacing traditional classrooms and educational systems that were based on industrial concepts with spaces and educational models that facilitate connection and flow (Law & Urry, 2004) was observed to lead to pedagogical innovation and the emergence of new socio-pedagogical cultures. These cultures were characterised by individualised learning, collaborative learning, integrated curricula, formative assessment practices, and were found to support constructivist learning experiences and generally high levels of student engagement. Furthermore, the dynamic and non-linear nature of these systems enabled them to ‘learn’ (Davis & Sumara, 2006) as they responded to positive feedback loops.
Chapter 8: Conclusions

Figure 8.2. The study’s field of inquiry. Chapter focus: the relationships between physical learning environments, pedagogies and student engagement.

Introduction

In this final chapter, I return to the key research question: *How can middle years’ learning environments be designed and used to support contemporary constructivist pedagogies and improve student engagement?* To address this question, I provide a brief summary of the major findings that were presented and discussed in Chapters 5, 6 and 7. In addition, I present and discuss some additional findings that resulted from subsequent analysis and theorising. In drawing my final conclusions, I explore the implications of the findings for the design and occupation of middle years’ learning environments and the reform of middle years’ education. In addition, I reflect on the research process, identify some limitations of the research, and make suggestions for further research.

Summary of the research findings

In this section, I briefly reiterate the major findings of Chapters 5, 6 and 7 under headings derived from the subsidiary research questions. These findings were the product of two years of ethnographic and participatory action research (PAR) across three case study sites (schools). The qualitative data that
contributed to these findings was collected through observation, semi-structured interviews, focus group forums and workshops.

The ways contemporary constructivist middle years’ pedagogies influenced the design of learning environments

Drivers for change

School leaders believed that the ‘cells and bells’, or industrial, model of education that was occurring in traditional classrooms was holding back pedagogical innovation and leading to poor student engagement. They wished to create new socio-spatial contexts for learning that could support the adoption of contemporary constructivist middle years' pedagogies. It was their collective desire to create learning environments that could support the integration of subject matter across learning domains, to develop learning communities that exhibited internal social cohesion and external connectedness, and to provide students with a schooling experience that was engaging, meaningful and valuable to them in today's globalised society. Ultimately, their aim was to improve the overall experience of school for middle years' students and their teachers.

The importance of collaborative design

By questioning pre-existing norms associated with the social, spatial and temporal organisational structures in schools, school leaders created opportunities to explore the development of new socio-spatial contexts for learning. Collaboration with design professionals empowered school leaders and their school communities to deliver innovative facilities and imagine new educational futures. Consultation with teachers and students on these spatio-pedagogical projects contributed to the design process and set the course for significant social and cultural change in the case study schools.

School communities and designers embraced the notion that spatial design could shape pedagogical practice. To this end, school leaders did not want large open spaces that could be reconfigured in multiple ways, as they believed ‘flexible’ environments of this type would enable teachers to rearrange furniture and/or replicate traditional classroom settings. They desired a variety of settings that could sustain collaborative learning experiences, individual work and some didactic instruction. Subsequently, learning environments were expected to act as agents of change.

The architectural design process led not only to innovation in school design, but supported the cultural transmission of knowledge and behaviour associated with constructivist educational practices. As a
result, the curriculum and pedagogy frameworks that were developed in conjunction with the design of new spaces were found to go well beyond those previously imagined within the physical and conceptual constraints of the traditional classroom. In many ways, the spatial and pedagogical changes being pursued were in keeping with calls from academics for a critical pedagogy of space (McLaren, 1998; Fisher, 2002).

The desire to procure learning environments that could support contemporary constructivist pedagogies led to the creation of innovative spaces that were characterised by: an overall ‘learning landscape’ design (Neary et al, 2010); interconnection between purposeful activity settings; integration of circulation routes into learning areas; separation of dedicated teacher spaces from learning areas; varied furniture items and architectural fittings; integration of storage solutions that supported access to resources and tools (including ICT); attention to acoustic properties; and provision of blinds for the management of natural light.

**The influence of innovative middle years’ learning environments on pedagogies**

Innovative learning environments catalysed pedagogical and cultural change. These environments did not, however, directly shape new practices. Shifting pedagogical approaches and learning cultures required more than just the ‘disturbance’ that new spaces caused to the prior practices of teachers and students. Achieving change required overcoming early tensions and resistance to new practices from many teachers. The majority of teachers required professional learning support in order to adopt constructivist pedagogies and further assistance to take advantage of the affordances (Gibson, 1977) of innovative spaces.

*Initial geographic and pedagogical bewilderment*

When teachers first encountered the innovative learning environments in their schools many did not recognise the behaviour settings (Barker, 1968) that confronted them. As a result, they initially voiced and demonstrated difficulty aligning their educational practices with new spaces.

Students, on the other hand, generally made the transition into innovative spaces with relative ease. They enjoyed their new geographic freedom and the variety of pedagogical encounters that their new spaces afforded. On the other hand, the large homogeneous environment of the Hub at Seaside SC (prior to refurbishment) left students geographically bewildered and unsure how they should behave or participate in learning activities. Furthermore, teachers struggled to implement innovative pedagogies in this space.
Cultural change, collaboration and the social production of innovative learning environments

Cultural change occurred as teachers’ perspectives on how students learn changed. With professional learning support and opportunity for spatial and pedagogical experimentation, teachers and students began to embrace the educational opportunities afforded by innovative learning environments. Through a cyclical process of trial and reflection, they developed new environmental competencies (Steele, 1980; Lackney, 2008) and adopted new pedagogies.

New learning settings were socially produced through discourse and collaboration. Teachers worked in teams to develop and refine new pedagogical frameworks and related practices, including new spatial usage schemas. Furthermore, conversations between students and teachers led to shared understandings regarding the expected norms of behaviour. Through the social production of space, new forms of ‘space, time and being’ (spatiality) were developed. Students and teachers began to move within and between learning settings to appropriate spaces and manipulate furniture and objects to suit their pedagogical needs.

Both spatial ownership (Higgins et al., 2005) and surveillance (Foucault, 1975; Joseph, 2003) supported the development of new socio-pedagogical cultures. Shared ownership of space between students and teachers supported the democratisation of the learning situation and enabled students to pursue learning activities with greater self-direction. Surveillance by both teachers and students encouraged social cohesion and collaborative learning.

Professional learning and the adoption of constructivist pedagogies

Shifting the value systems through which teachers framed their professional conduct was essential for bringing about pedagogical change. Engaging teachers in discourse about contemporary middle years' learning theory and providing them with time for reflection was an effective technique for developing their understandings of contemporary pedagogies and refocussing the lenses through which they interpreted what was going on in particular learning situations. Students required regular opportunities to discuss with teachers how to get the most out of their new leaning environments if they were to engage deeply in constructivist learning activities.

Hybrid pedagogies, that were mixtures old and new practices, emerged. Although there was a strong focus on the adoption of constructivist pedagogies, instructivist approaches still played an important role. Teachers relied on instruction to introduce students to new areas of study, to scaffold students’ understandings of subject content, and to introduce them to new academic skills. In some instances, the
employment of these hybrid pedagogies resulted in new learning environments being used in ways that had not been anticipated by school leaders or designers.

**Factors that limited the adoption of contemporary constructivist pedagogies**

Poor design, characterised by limited spatial differentiation and poor acoustics, substantially hindered the development of contemporary constructivist pedagogies. Poor acoustic design in particular was found to place pressure on teachers to maintain traditional teacher-directed pedagogies. On the other hand, purposeful, interconnected spaces with high quality acoustics eased the burden on teachers to elicit desired behaviours from students. These spaces supported the creation of varied learning settings, enabled the flow of activity, and aided the adoption of contemporary constructivist pedagogies.

Time, as an agent/structure, both enabled and constrained constructivist pedagogies. Lessons of a short duration (approximately 50 minutes) did not support constructivist learning, while lessons of a longer duration (up to 150 minutes) supported student participation in a variety of related constructivist learning experiences. This finding was in line with middle years’ learning theory (Barratt, 1998; DEET, 2002; Pendergast & Bahr, 2005; Carrington, 2006).

**The ways innovative learning environments and contemporary constructivist pedagogies influenced socio-pedagogical cultures in the middle years and the impact of this on student engagement**

New socio-spatial contexts for learning emerged from complex interactions (Haggis, 2003; Law & Urry, 2004; Davis & Sumara, 2006; Heylighten, Cuillers & Gershenson, 2007; Urry, 2008) between innovative learning environments and the behaviours of teachers and students participating in constructivist learning activities. These new contexts for learning supported the flow of people, materials, and information between purposeful activity settings and enabled teachers and students to develop a variety of new learning behaviours. Furthermore, non-linear interactions between the physical and social components of these new contexts led to the emergence of new socio-pedagogical cultures. Framed by new physical, pedagogical and temporal arrangements, these emergent cultures exhibited self-organizing properties (Heylighten, Cuillers & Gershenson, 2007; Heylighten, 2008) and guided student participation in constructivist learning experiences.
Student engagement in emergent socio-spatial contexts and socio-pedagogical cultures

New socio-spatial contexts for learning and socio-pedagogical cultures were found to have a positive overall influence on student engagement. Students were highly engaged when working on constructivist, project-based activities that enabled them to work individually or in small groups on multiple aspects of a task, across a variety of activity settings and when using a variety of learning materials and resources. Intermittent conversation between students was essential to maintain their engagement.

Team teaching generally supported student engagement, however, ensuring the collective efficacy (Tshannen-Moran et al., 1998) within teacher teams was important to ensure that students did not ‘slip between the cracks’ and avoid participating in learning activities. In situations where both teachers and students recognised their collective responsibilities and their roles as members of ‘the team’, the democratic learning cultures that emerged had a positive influence on student engagement.

The study revealed that body language was a useful indicator of student engagement. Close proximity between small groups of students appeared to support engagement in both collaborative activities and individual activities. However, while high student density was desirable within groups, it was not desirable between groups. These findings had spatial implications, as the proximity between students was often mediated by furniture items.

Access to ICT was found to support self-directed learning and enhance student engagement. Ubiquitous access to online information and a variety of presentation media supported student engagement in inquiry-based projects and enabled students to frequently transition between physical and virtual/digital media. It also helped break down boundaries between learning at school and at home. Complex interactions (Haggis, 2003; Law & Urry, 2004; Davis & Sumara, 2006; Heylighten, Cuillers & Gershenson, 2007; Urry, 2008) between people, environments and technology contributed to the emergence of hybrid learning environments (Skill & Young, 2002; Weiss, 2007) and the development of new pedagogies. These emergent practices demonstrated that in-class (physical) and out-of-class (virtual/online) activities could be integrated, and that these learning experiences could be highly engaging.

The effectiveness of innovative middle years’ learning environments related to pedagogical approaches and student engagement

The effectiveness of the innovative learning environments in the case study schools was associated with how well they supported complex interactions. These environments functioned best when students were able to take ownership of their learning and work with some autonomy, while concurrently having the
opportunity to interact directly and indirectly with peers, teachers, technologies and the physical environment. The socio-pedagogical cultures that best supported constructivist pedagogies and student engagement were characterised neither by social order, nor disorder, but by social dynamics that were “situated somewhere in between” (Heylighten, Cuillers & Gershenson, 2007). Furthermore, the effectiveness of these environments was a product of how well they aligned with particular pedagogies, curricula, assessment practices, and social factors.

Assessing the educational effectiveness of other learning environments

For learning environments to be assessed for the ways they can support contemporary constructivist pedagogies and student engagement, it appears that they must be assessed subjectively within the context of the educational model(s) they are intended to support. Such assessments should be based on the educational visions that informed the design and on the opinions of the school leaders, teachers and students who experience the complex physical and social interactions that occur in these learning environments following occupation.

The role of innovative architecture in a complex adaptive system of education

Exploring the role of innovative learning environments through the lenses of complexity theory (Haggis, 2003; Upitis, 2004; Davis & Sumara, 2006; Heylighten, Cuillers & Gershenson, 2007, Cohen, Manion & Morrison, 2007; Heylighten, 2008) and complex adaptive systems theory (Law & Urry, 2004; Urry, 2008) showed the need for complex adaptive systems of education that can respond to the needs of individuals, school communities and wider society. In the increasingly globalised world of the 21st century, rapid change has become the norm and schooling systems need to learn how to make regular adjustments if they are to remain relevant. Innovative architecture has an important role to play in this process. Replacing traditional classrooms and education models based on industrial concepts with learning environments and education models that facilitate connection and flow was observed to lead to pedagogical innovation and the emergence of new socio-pedagogical cultures that supported high levels of student engagement. Furthermore, the dynamic and non-linear nature of these complex systems enabled them to ‘learn’ as they responded to positive feedback loops. Such ‘learning’ enabled middle years’ cohorts to function as complex adaptive systems and self-organise to cope with a variety of pressures and disturbances, while supporting contemporary learning experiences that were aligned with current middle years’ educational theories (Barratt, 1998; Hill & Russell, 1999; Beare, 2000a; DEET, 2002; Smyth, McInerney & Hattam, 2003; Pendergast & Bahr, 2005; Carrington, 2006; Smyth & McInerney, 2007; DEECD, 2009a).
**Additional research findings**

In this section, I report some additional findings that emerged following subsequent analysis and theorising based on the findings from the fieldwork and the literature.

**The co-evolution of educational practice and school design in the middle years**

As mentioned previously, the architectural design processes that occurred in the case study schools supported the cultural transmission of knowledge and behaviour associated with educational practices informed by constructivism. This cultural transmission led to the development of educational visions and physical learning environments that went well beyond those previously imagined.

Below, I discuss my observation of two co-evolutionary processes. The first related to the architectural design process and the second related to the occupation of space. These co-evolutionary processes were recognised following theorising through the lenses of complexity theory (Haggis, 2003; Uptis, 2004; Davis & Sumara, 2006; Heylighten, Cuillers & Gershenson, 2007; Cohen, Manion & Morrison, 2007; Heylighten, 2008) and complex adaptive systems theory (Law & Urry, 2004; Urry, 2008) (see Chapter 7).

*Co-evolution during design*

A review of the design processes that occurred in the case study schools revealed the existence of a co-evolutionary relationship between the educational visions of the school leaders and the designs of new learning environments. In an emergent process, educational visions informed school designs, and school designs informed educational visions. As school communities and design professionals collaborated to design new learning environments, educational opportunities that had not been imagined previously within the conceptual and physical constraints of traditional classrooms were recognised.

This relationship was evident at Seaside SC and Inner City PS during the participatory action research (PAR) phases of the study – especially during the periods that focussed on the refurbishment of the Hub (Seaside SC) and the interior fit-out of the Year 5/6 area (Inner City PS). Interviews with school leaders at Suburban HS also uncovered evidence of this co-evolutionary relationship between ‘vision’ and ‘design’. I believe this relationship had a profound influence on both the education models and learning environments that were developed at the three sites.

In Chapter Five, I reported that school leaders believed that a clear educational vision should inform the design of new learning environments. Although this would appear logical, this research demonstrated that
when curriculum, pedagogy and assessment frameworks were developed in conjunction with the design of new learning environments, innovative socio-spatial contexts for learning that went beyond previous educational visions could be created. By viewing education as an environmental enterprise (Gump, 1980), as well as one mediated by the standard educational mechanisms of curriculum, pedagogy and assessment, innovative education models were developed.

The co-evolutionary relationship between educational practice and school design appeared to be influenced by both ‘adaptation’ and ‘selection’ (Anderson, 1999; Lewin, Long, & Carroll, 1999; Volberda & Lewin, 2003). Educational models were observed to ‘adapt’ as new spatial affordances (Gibson, 1977) were recognised during the process of design. Concurrently and reciprocally, the designs of new learning environments were observed to adapt as the educational models that informed them evolved. Meanwhile, education models and spatial designs were subjected to ‘selective pressures’ as design ideas were put forward, evaluated for their suitability in supporting student learning and either accepted or rejected.

The adaptation and selection processes that I observed were not random. Rather, these processes were informed by knowledge gained through the testing of contemporary educational practices in prototype innovative learning environments. As discussed in Chapter 4, a prototype innovative learning environment was created at Suburban HS to trial constructivist pedagogies and new spatial usage schemas prior to the design and construction of the SWiS buildings. At Inner City PS a spatio-pedagogical trial was undertaken during the period when the Year 5/6 cohort occupied the school’s library while their spaces were being refurbished. At Seaside SC, the initial three years of occupation in the Hub acted as a spatial and pedagogical trial of this space. These opportunities for both spatial and pedagogical ‘experimentation’ provided school leaders and design professionals with information upon which they could make better informed decisions.

Co-evolution during use

The co-evolutionary relationship that was observed during the process of designing the new learning environments in the case study schools was observed to continue following the occupation of these spaces. Rather than a relationship between ‘vision’ and ‘design’, this relationship became one between ‘practice’ and ‘spatiality’.

Through a process of reflecting on their pedagogical practices and their use of space, teachers and students established a co-evolutionary relationship between ‘practice’ and ‘spatiality’. This relationship developed as teachers and students engaged with and used their new environments. As their environmental competencies (Steel, 1980; Lackney, 2008) evolved, new forms of spatiality (space/time/being) also evolved. Thus, through a process of co-evolution and mutual adaptation
(Heylighten, Cuillers & Gershenson, 2007), new practices and new forms of spatiality emerged. Furthermore, as both teachers and students trialled new pedagogies and spatial usage schemas, ineffective pedagogies were cast aside and those practices perceived to be more effective were continued and refined.

**Student engagement through the lens of human geography**

Based on their thorough review of the literature on student engagement, Fredricks, Blumenfeld and Paris (2004) suggested that future research into student engagement should investigate how students and educational contexts interact. They neglected, however, to recognise the physical environment as a component of these educational contexts, instead focusing on the social components. This was not surprising, as my review of the literature on student engagement revealed that only a few educational researchers have recognised the influence that space may have on student engagement (e.g. Zyngier, 2007; Janowska & Atlay, 2008).

As suggested by Fredricks, Blumenfeld and Paris (2004) I investigated interactions between students and educational contexts. In the process, I extended the discourse about student engagement by making connections between this construct and physical learning environments and pedagogical practices. Some additional findings that suggested high levels of student engagement strongly correlate with students’ geographical experiences and are therefore influenced by the design of learning environments. These findings also suggested that the sense of place that students experienced within particular socio-spatial contexts influenced their engagement, as did socio-pedagogical cultures.

*Geographical engagement*

The findings from the fieldwork phase of this study indicated that students were highly engaged when participating in self-directed activities that involved them working on project-based tasks. Such activities enabled them to work individually or in small groups on multiple aspects of a task, across a variety of activity settings, and when using a variety of learning materials and resources. It is clear from these findings that the ways students interacted with their learning environment, as well as with their peers and teachers, had a profound influence on their engagement.

My review of the fieldwork findings against the three-part typology for student engagement put forward by Fredricks, Blumenfeld and Paris (2004) – behavioural, emotional and cognitive engagement sub-types – revealed some further findings that I summarise briefly below.
Students’ behavioural engagement, which Fredricks, Blumenfeld and Paris (2004) associated with the notion of participation, was supported by opportunities to participate in a variety of academic and social activities, and the ability to transition between activities – as needed – to fulfil curriculum requirements. In addition, behavioural engagement was supported by opportunities for students to take ownership of their learning environment and subsequently their learning. To this end, supporting students to develop a strong sense of place was identified as important because with this came understandings of the social programs that supported constructivist learning.

Students’ emotional engagement, which Fredricks, Blumenfeld and Paris (2004) associated with positive and negative reactions to teachers, classmates, academics, and school, was supported by opportunities for students to work with autonomy and to negotiate with teachers and fellow students how to tackle particular tasks. Furthermore, ubiquitous access to ICT supported inquiry-based learning and offered students the opportunity to learn from a variety of online media and the chance to present their findings in diverse forms. In most instances, opportunities for choice engendered positive student reactions to the tasks they were required to complete and appeared to support their willingness to do the work.

Students’ cognitive engagement, which Fredricks, Blumenfeld and Paris (2004) associated with the willingness of students to exert effort to comprehend complex ideas and master difficult skills, was supported by opportunities for frequent discourse between students, and between students and teachers. Working collaboratively with others appeared to enhance students’ willingness to tackle complex problems and multifaceted tasks.

Based on these findings, I suggest that ‘geographical engagement’ should be considered an important sub-type of the ‘student engagement’ construct. I suggest that geographical engagement is associated with students’ affinity for their surroundings and the sense of place that they feel in connection with their school learning environments. Furthermore, I associate geographical engagement with students’ ownership and mastery of their environment (including the resources and materials that are contained within) and suggest that geographical engagement is expressed by students in the ways they socially produce space to support their learning activities and by their ability to engage in learning activities with some autonomy.

Observation in the case study schools revealed that the majority of students developed reasonably high levels of geographical engagement following a period of adjusting to their new spaces. I attributed this largely to the affordances (Gibson, 1977) of these environments and to the constructivist pedagogies that were employed within them. For the majority of students, liberation from traditional classroom settings appeared to empower them to take on more responsibility for their learning. Subsequently, the relative success that they experienced as self-directed learners appeared to be correlated with their levels of
geographical engagement. The students who gained most from complex interactions with other people, their environment and technology were those who developed an affinity for their environment and as a result were able to make good use of the learning resources that were available to them. Furthermore, I suggest that through their geographical engagement these students developed both initiative and problem solving skills.

**Implications of the findings for the design and use of middle years’ learning environments and middle years’ educational reform**

Evans and Gruba (2007, p. 121) suggested that “summaries are not conclusions … conclusions are a statement of the significance of what you found out”. In this section, I outline the significance of my research findings and discuss their implications for the design and use of middle years’ learning environments and middle years’ educational reform. I draw conclusions about where current debates regarding the design of both education models and learning environments are situated in history and how the design of contemporary middle years’ education models and learning environments should be approached. In addition, I make recommendations regarding how middle years’ learning environments should be designed, how these environments should be used to engage students in both learning and with school and the role of school design in middle years’ educational reform.

**Towards contemporary education models and learning environments – the 1970s and today**

Current debates about educational practice and school design mirror those of the 1970s, when educators and architects first attempted, on a large scale, to determine what education models and learning environments were preferable to the ‘industrial model’ (Gross & Murphy, 1968; Meyer, 1971; Pritchard & Moodie, 1971; Traub, Weiss & Fisher, 1974; Angus, Evans & Parkin, 1975; Weinstein, 1979; Beck, 1980; Klein & Eshel, 1980; Rodwell, 1998; Brogden, 2007; Marks, 2009). Through this research I have demonstrated that during the process of trying to transform their education models and learning environments the case study school communities had to address many of the same issues that confronted their predecessors 30-40 years ago. I believe that the following quote from Weinstein (1979) encapsulates just how similar the problems that were faced during the 1970s are to those being faced today:
It is time to move beyond appeals for classrooms that are flexible, attractive, and humane. Our eventual goal must be to specify the appropriate physical contexts for various educational activities (Weinstein, 1979, p. 603).

Certainly, Weinstein’s conclusion encapsulated the attitudes of the school leaders who took part in this study. Rather than be content with education models that were constrained by traditional classrooms, they pursued the creation of new socio-spatial contexts for learning that could support the development of contemporary education models and aid the transformation of their schools’ pedagogical approaches. Furthermore, they wished to create finely tuned learning environments that could support a variety of learning activities and experiences.

Weinstein’s conclusion could easily have been written today. This suggests that creating learning environments that can play an active role in supporting post-industrial/contemporary education models remains a lofty goal. Hopefully the findings of this research will contribute to current debate regarding how middle years’ education models should be structured and about how learning environments should be designed to actively support these models.
Approaching school design for contemporary middle years’ education

The following diagram (see Figure 83) illustrates my suggested approach to spatio-pedagogical projects for the middle years of school. It represents a holistic approach to creating new education models and designing new learning environments—the ultimate goal being to support high quality student learning. The nested structure of the diagram should be read from the outside-in.

Figure 83. Approaching spatio-pedagogical projects for the middle years of school.

Start with a philosophy of education and a vision for learning

Based on the research findings, I suggest that spatio-pedagogical projects should be initiated with discussions regarding peoples’ beliefs about how students learn. Such discussions are important for establishing the ‘philosophy of education’ that will guide these projects in the short and long term. Subsequently such discussions about learning theory can be distilled to establish a ‘vision for learning’ that articulates the shared values and beliefs of a school community. The vision should summarise the
As the research findings indicated, both a well considered philosophy of education and a well articulated vision for learning are essential ingredients in the planning for and provision of new learning environments and likely to determine their relative success. Participants in these projects should be aware, however, that their educational visions are likely to co-evolve with the design of new learning environments during the architectural design process. I suggest that it is important for school communities to remain open to iterative design processes that allow for the testing, accepting and rejecting of ideas—both educational and spatial.

Consider organisational structures, resources and practices concurrently

The research findings indicated that social organisational structures, learning environment design, ICT integration, use of time, pedagogies, curriculum and assessment, and spatiality all need to be carefully considered. Decisions about these organisational structures, resources and practices, informed by well articulated visions for learning, should be made concurrently.

Generate a culture of learning that facilitates rich learning experiences and high quality student learning

Having established the organisational structures, resources and practices that will support student learning, the next objective is to generate a ‘learning culture’ that carries with it a system of shared meanings that will guide the practices of teachers and students and assist them to make the most of their educational opportunities. This learning culture should facilitate a variety of rich learning experiences and provide students with a high quality education that is of value to them in contemporary society.

Who should be involved?

These projects are as much about cultural change as they are about pragmatic changes to buildings and educational practices. Therefore, school communities and design professionals need to regularly consult with stakeholder groups and encourage them to participate in the journey of change. The inclusion of teachers and students is especially important. If change is to be effective and sustained, teachers and students need to develop well formed understandings of why changes are being made and how these changes are likely to influence both their beliefs and practices. Also, as illustrated by this research, teachers and students can make important contributions to these projects.
Implications of the findings for the design and use of middle years’ learning environments

Reflexive spaces for a complex adaptive system of education

The complex teaching and learning behaviours of teachers and students that I observed in the innovative learning environments of the case study schools led me to conclude that middle years’ learning environments should be designed with the express intention of supporting a variety of learning experiences/behaviours/pedagogical encounters. Others, including Fisher (2005), Lippman, (2007), Stephenson (2007) and Featherston (2011), reached similar conclusions.

Contemporary middle years’ education models, informed by constructivist theories of education (Dewey, 1966; 1971; Friere, 1970; 1973; Vygotsky, 1986; Newmann 1992; Strommen & Lincoln, 1992; Gardner, 1993; 1999; Bruner, 1996; DEET, 2002; Pendergast & Bahr, 2005; DEECD, 2009b) require learning environments to play an active role in students’ educational experiences. Furthermore, the complexity of these education models suggests that if learning environments are to be effective, they need to take on a reflexive quality. Consequently, I propose that ‘reflexive spaces’ are needed that both inform pedagogical encounters and are informed by pedagogical encounters. I use the term ‘reflexive’ to refer to a bidirectional relationship between the physical environment and social actors/inhabitants.

The reflexive spaces that I propose have a virtually spontaneous temporal element that enables them to respond rapidly to a variety of pedagogical approaches. As such, the reflexive process is one that occurs while inhabitants use their environment, as opposed to being a process associated with design. The term ‘reflexive architecture’ has been used by others to communicate a range of meanings associated with processes of architectural design (Spiller, 2002; Schwarz, 2002; Lippman, 2010). In my conception, reflexive spaces inform inhabitants of the intended uses of a space, while at the same time enabling them to inform the space through their behaviour and their manipulation of the space. In this way, reflexive spaces inform pedagogical encounters, while also being informed by pedagogical encounters. I see reflexive spaces being embodied in the built form, enacted through complex interactions with inhabitants and responsive to positive feedback loops (Law & Urry, 2004). The idea of reflexive spaces draws on the concepts of built pedagogy (Monahan, 2000; 2002; 2005) behaviour settings (Barker, 1968; 1970; 1976; Barker & Gump, 1964; Gump, 1980), purposeful learning settings (Featherston, 2011), the social production of space (Soja, 1989; Lefebvre, 1991a), and the Reggio Emilia notion of the environment as the third teacher (Kinney & Wharton, 2008; Hall, 2010).
Reflexive, not flexible, learning environments are needed

Flexibility is a term widely used by educators and architects to describe spaces that can cater to a variety of learning experiences (Woodman, 2011). Although ‘flexibility’ suggests that spaces may respond to the needs of inhabitants, it suggests nothing about the role that space can play in informing teachers and students about how they might engage in particular learning activities. Reflexivity is different to flexibility. While the utility of flexible spaces is limited by the environmental competencies of users, reflexive spaces suggest to users how they might participate in learning activities, while concurrently enabling them to fine tune learning settings to suit their pedagogical needs.

This study indicated that the environmental competency of teachers and students is often limited. Indeed, few of the individuals who took part in the study were readily able to physically reconfigure spaces to suit a variety of pedagogical encounters. Therefore, middle years’ learning environments should be designed to embody a reflexive quality.

Pragmatic design and use principles for middle years’ learning environments

In order to directly address the key research question, ‘How can middle years’ learning environments be designed and used to support contemporary constructivist pedagogies and improve student engagement?’, I have provided a brief list of design principles for middle years’ learning environments in Appendix 4 (see page 297). These design principles stem from the findings of the research. Furthermore, in keeping with the list of design principles discussed to above, I have provided a brief list of use principles for innovative middle years’ learning environments in Appendix 5 (see page 299). These also stem from the findings of the research.

Implications of the findings for the reform of middle years’ education

Fisher (2002) suggested that innovation in the architectural design of school learning environments may be one interventionist strategy with the potential to catalyse pedagogical reform. The findings of this research supported this conjecture. Specifically, the findings suggest that carefully designed innovative learning environments may have a profound influence on teaching and learning practices when backed by ongoing professional learning support for teachers. As demonstrated by the research, reforms such as those advocated by the Middle Years Research and Development (MYRAD) Project (DEET, 2002) may be taken up by schools within months of occupying new learning environments. These reforms include; strengthening teacher-student relationships; involving students in decision-making about content, process and assessment; presenting authentic tasks that require complex thought and allowing time for
exploration; inclusion of processes involving co-operation, communication, negotiation and social competencies generally; and providing for individual differences in interest, achievement and learning styles (DEET, 2002).

I believe the reform actions that were witnessed in this study were ultimately the result of changes to the socio-pedagogical cultures in the case study schools. The study revealed that acceptance of resident learning cultures by teachers and students was significantly disrupted by the creation of new learning environments and that this disruption created opportunities for the adoption of new practices. In response to Elmore's suggestion that powerful pervading cultures in schools often act to maintain the status quo and negate systemic change (Fullan et al., 2007), I contend that these cultures are embodied in the built pedagogy (Monahan, 2005) of traditional classrooms and that such cultures may be altered by changing the socio-spatial contexts in schools. This study indicated that if the “fundamental conditions of teaching and learning for students and teachers” (Elmore, 1996, p. 3) are to be improved, educational reform agendas need to address changes to the built environment.

**Reflections on the research process**

In 1979, Weinstein called for researchers to “not only acknowledge the complexity of environment-behaviour relationships but also to design and interpret studies to reflect this complexity” (1979, p. 600). She suggested that research of this nature was required so that research-based guidelines could be produced to assist educators and architects when creating new learning environments. This study, conducted approximately 30 years after Weinstein made these comments, was still aligned with her desire for more research into these complex relationships. In particular, I believe that the praxis-related approach (Mattsson & Kemmis, 2007) to the study, informed by critical social theory (Habermas, 1971; 1974; 1989; Ewert, 1991; Leonardo, 2004), was suited to investigating the relationships between physical learning environments, pedagogies and student engagement. Furthermore, Mattsson and Kemmis (2007) proposed that the quality of praxis-related research should be assessed not solely on the outcomes of the academic inquiry but also on the pragmatic outcomes of the research. Based on this conjecture, the changes that were made to both learning environments and pedagogies in the case study schools provided evidence of the authenticity of the new knowledge that was gained. To this end, the findings of the study were validated by the actions of the research projects' participants/co-researchers—the school leaders, teachers and students.
Limitations of the study

Some potential limitations of the research were identified concerning its design in Chapter 3. These included the research not being replicable due to its unique social settings and temporal elements, and the findings of the research not being transferable to other settings or contexts because of their close association with the sampled populations. In addition, the restriction of the field inquiry to middle years’ learning environments may be considered a limitation of the design of the study.

I believe these limitations were outweighed by the strengths of the research approach. In particular, the qualitative methodologies and methods that were employed aided the development of deep understandings regarding the relationships between physical learning environments, pedagogies and students engagement and the thick description (Bryman, 2004) that was produced enables readers to identify the relative transferability of the findings to other settings and/or contexts. Furthermore, maintaining a focus on middle years’ learning environments was important to ensure that the field of inquiry was contained.

Concerning the conduct of the research, there two areas of the study that I would like to have investigated further: the perspectives of the architects, interior designers, and landscape architects who participated in these spatio-pedagogical projects and the influence of the leadership styles of the school leaders on the relative success of the spatio-pedagogical projects in the case study schools. Research into these areas may have added another layer of meaning to the study. Unfortunately, this was not possible due to limitations associated with time and resources.

Suggestions for further research

Further research into understanding how learning environments, as complex systems, can be designed and used to support learning is required. Based on the findings of the study, I suggest that future research concerning the learning/space nexus should focus on:

- the pedagogical roles that teachers and students could play in innovative learning environments designed to support constructivist learning;
- spatial and pedagogical transitions between early years, primary, secondary, and tertiary education sectors;
- frameworks for post occupancy/building performance evaluations that take into account the useability of physical learning environments and assess their influence on learning;
- the types of professional learning opportunities that can best support teachers to adopt constructivist pedagogies, team-teach, understand the role of space in education and utilise innovative learning environments;
- the influences that innovative learning environments may have on gender specific preferred learning styles;
- building design that can support good acoustics while enabling complex interactions to occur.

The co-evolution of educational practice and school design has entered a phase of rapid change across all education sectors. These changes need to be researched and the resultant information used to create better education models and learning environments to support these models. Research into these areas will contribute to a body of knowledge that will aid the development of a new mainstream educational paradigm that is rapidly evolving to fill the void left by the increasingly defunct ‘industrial model’.

**Conclusion**

This study revealed that carefully designed innovative learning environments can support the adoption of constructivist pedagogies and aid student engagement. The argument I developed throughout this dissertation, however, suggests more than this. In contemporary society, students are required to apply and communicate their knowledge, skills and understandings in a wide variety of settings. Consequently, it is vital that the cultures in which they learn are in keeping with the broader societal cultures and contexts in which they live and that learning environments be designed to reflect these cultures and contexts. With the rapid development of information and communication technologies, the exponential rate of information production, and the creation of new social structures brought about by globalisation (Monahan, 2005), the socio-spatial contexts in which students learn need to be aligned with societal circumstances in order to support student learning that is engaging, meaningful and valuable.

The development of skills for life-long learning is essential in today’s ever changing world. Creating innovative learning environments that can support student participation in social systems in which they are active and empowered participants can only improve their prospects in a world that is demanding agility and adaptability in the workplace and in daily life. I hope that the findings of this study will help inform both educators and architects about how to design and use middle years’ learning environments to support education models that are aligned with contemporary society.
References


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Appendix 1: Interview themes and questions

The questions listed below are a guide to the types of questions that were asked in the semi-structured interviews conducted in the research project. The list of themes (underlined) provided a general structure for each interview. The specific questions asked of interviewees varied depending on the direction that each interview took. Not all questions were asked of all interviewees.

Interview themes and sample questions for principals and teachers involved in designing learning environments:

Intended purposes of (specific) learning environments and reflections on these intentions:

- In designing these learning environments, what was hoped to be achieved? What were the intentions?
- How have the learning environments met with your expectations?
- Are the learning environments being used in the ways you expected they would be – pedagogically, for environmental sustainability education, other?

Perceptions and experiences of (specific) learning environments:

- What are your impressions of the learning environment? What do you like or dislike about it?
- Do you think the design of the learning environment dictates the ways in which it is used by the teachers and students? Explain?
- Do you think the design of the learning environment affects the student’s experience of school? How?
- Could the student’s experience of the learning environment be something that affects them beyond school? How?

Teacher interactions with students and other teachers:

- Do you think the ways in which students and teachers interact socially is being influenced by the learning environment? How?

Management of space to facilitate student engagement in learning:

- How does the learning environment influence the ways in which teachers manage student’s engagement in learning? Does the learning environment enable personalised learning for students? Is this productive learning?
- How does the learning environment affect the ways in which teachers maintain surveillance and discipline of students? Does the space allow teachers to manage students appropriately?
Do you think the design of the learning environment affects the ways in which students and teachers behave and communicate? Explain?

Are you aware of how ‘power’ is distributed between the teachers and students in the learning environment? How does the distribution of ‘power’ affect the social setting and the teaching and learning practices?

What influences do you think the learning environment has on the social culture in the school? Has a productive culture been established? Explain? Do you think the design of the learning environment has played a significant role in establishing this culture? How?

Connections between pedagogies and space:

What are the main pedagogies, or teaching practices, that you see being employed by teachers to enable student learning within the learning environment?

Does the learning environment influence the pedagogies that you see being employed? How? What positives or negatives do you perceive regarding this influence? Does the learning environment restrict teachers from employing particular pedagogies? Which types of pedagogies?

How could teachers and students make better use of the learning environment? What might they do?

What would you change about the learning environment?

How do you think the pedagogies employed by teachers affect the students’ experience of the learning environment - in terms of their use of space, their social interactions and their personal sense of the learning environment?

Do students have an influence over the ways in which the learning environment is used and experienced? Do they manage space? How?

Are students encouraged to manage the learning environment? How is this communicated?

Is it important to control student’s use of space? Why?

Does the learning environment influence the ways in which information is accessed by students? Can you identify how student’s access information? Do these methods of accessing information affect the ways in which students learn?

Do you think the learning environment facilitates student engagement in learning? Explain? What do you base this assessment on?

Student engagement in learning:

What indicates to you that students are engaged in learning?

Do you think the learning environment can influence student engagement in learning? How?

How could teachers make better use of the learning environment to engage students in learning?
Use of the built environment to support environmental sustainability education:

- Are you aware of the environmentally sustainable features of this building? Can you describe these features?
- Are the buildings sustainable features utilised to support student learning about living sustainably? How are these features used to support such learning? Are there connections made with the curriculum?
- How aware do you think the students are of the buildings environmentally sustainable features? In what ways do they interact with these features and experience them? Is such experience ongoing? Does it occur over a dedicated period of time?
- Could teachers make better use of the built environment to support student learning about living sustainably? How?

Communities of practice:

- How would you describe the collegiate atmosphere amongst the teaching staff?
- Do you think the teaching-staff are supportive of each other? In what ways/why not?
- Does the design of the learning environment affect the ways in which teachers communicate and work with each other? How?
- Do you think the design of the staff study areas and social facilities are appropriate? Why? Could they be improved? Why would you recommend these improvements?

Perceptions of the events that occur during the participatory action research (PAR) projects to occur in each case study school regarding the use of learning environments:

- Questions not yet able to be determined.

Perceptions regarding changes in the learning community that may have occurred due to the PAR projects:

- Questions not yet able to be determined.
Interview themes and sample questions for teachers:

Perceptions and experiences of (specific) learning environments:
- What are your impressions of the learning environment in which you teach? What do you like or dislike about it?
- How does the learning environment affect the ways in which you teach?
- Do you feel that the learning environment supports your preferred teaching methods/pedagogies? Explain?
- Do you think the design of the learning environment dictates the ways in which you use it? Explain?
- Do you think the design of the learning environment affects the student’s experience of school? How?
- Could the student’s experience of the learning environment be something that affects them beyond school? How?

Teacher interactions with students and other teachers:
- How are the ways in which you interact socially with students influenced by the learning environment?
- How are the ways in which you interact socially with other teachers influenced by the learning environment?

Management of space to facilitate student engagement in learning:
- How does the learning environment influence the ways in which you manage student’s engagement in learning? Does the learning environment enable personalised learning for students? Is this productive learning?
- How does the learning environment affect the ways in which you maintain surveillance and discipline of students? Does the space allow you to manage students appropriately?
- Do you think the design of the learning environment affects the ways in which students and teachers behave and communicate? Explain?
- Are you aware of how ‘power’ is distributed between the teachers and students in the learning environment? How does the distribution of ‘power’ affect the social setting and the teaching and learning practices?
- What influences do you think the learning environment has on the social culture in the school? Has a productive culture been established? Explain? Do you think the design of the learning environment has played a significant role in establishing this culture? How?

Connections between pedagogies and space:
What are the main pedagogies, or teaching practices, that you employ to enable student learning within the learning environment?

Does the learning environment influence the pedagogies that you employ? How? What positives or negatives do you perceive regarding this influence? Does the learning environment restrict you from employing particular pedagogies? Which types of pedagogies?

Could you make better use of the learning environment? What might you do?

What would you change about the learning environment?

How do you think the pedagogies you employ affect the students' experience of the learning environment - in terms of their use of space, their social interactions and their personal sense of the learning environment?

Do students have an influence over the ways in which the learning environment is used and experienced? Do they manage space? How?

Are students encouraged to manage the learning environment? How is this communicated?

Is it important to control student's use of space? Why?

Does the learning environment influence the ways in which information is accessed by students? Can you identify how student's access information? Do these methods of accessing information affect the ways in which students learn?

Do you think the learning environment facilitates student engagement in learning? Explain? What do you base this assessment on?

Student engagement in learning:

What indicates to you that students are engaged in learning?

Do you think the learning environment can influence student engagement in learning? How?

How could you make better use of the learning environment to engage students in learning?

Use of the built environment to support environmental sustainability education:

Are you aware of the environmentally sustainable features of this building? Can you describe these features?

Are the buildings sustainable features utilised to support student learning about living sustainably? How are these features used to support such learning? Are there connections made with the curriculum?

How aware do you think the students are of the buildings environmentally sustainable features? In what ways do they interact with these features and experience them? Is such experience ongoing? Does it occur over a dedicated period of time?

Could you make better use of the built environment to support student learning about living sustainably? How?
Communities of practice:
- How would you describe the collegiate atmosphere amongst the teaching staff?
- Do you think the teaching-staff are supportive of each other? In what ways/why not?
- Does the design of the learning environment affect the ways in which teachers communicate and work with each other? How?
- Do you think the design of the staff study areas and social facilities are appropriate? Why? Could they be improved? Why would you recommend these improvements?

Perceptions of the events that occur during the participatory action research (PAR) projects to occur in each case study school regarding the use of learning environments:
- Questions not yet able to be determined.

Perceptions regarding changes in the learning community that may have occurred due to the PAR projects:
- Questions not yet able to be determined.
Interview themes and sample questions for students:

Perceptions and experiences of (specific) learning environments:
- What are your impressions of the learning environment in which you are a student? What do you like or dislike about it?
- Do you feel that the learning environment helps you learn? Explain?
- Do you think the design of the learning environment affects your experience of school? How?

Student interactions with teachers and other students:
- How does the learning environment influence the way you communicate (interact socially) with your teachers?
- How does the learning environment influence the way you communicate (interact socially) with other students?

Management of space to facilitate student engagement in learning:
- Do you think the learning environment has an overall positive or negative influence on the culture in the school? Explain? How does the learning environment affect the culture?
- Do you think the design of the learning environment affects the ways in which students and teachers behave? Explain?
- Do you feel that teachers are able to manage the students appropriately?

Connections between pedagogies and space:
- Do you think that the teachers allow you to make the most of the learning environment? Explain?
- Do you feel that you have a say regarding where in the learning environment you learn? Explain?
- Could you make better use of the learning environment? What might you do?
- What would you change about the learning environment?
- Can you identify how you collect information to support your learning? How do these information sources help you learn?

Student engagement in learning:
- What types of learning activities do you find most interesting?
- What types of learning activities do you play most attention to?
- What types of learning activities help you learn best?
- Do you like to work on your own or with other students? How many other students do you prefer to work with? Why?
- How can teachers be of most help to support your learning?
- Do you think the learning environment affects the way you learn? How?
• How could you make better use of the learning environment to support your learning?

Use of the built environment to support environmental sustainability education:
• Are you aware of the environmentally sustainable features of this building? Can you describe these features? How have you learnt about them?
• In what ways do you interact with these features and experience them? Is such experience ongoing? Did it occur over a dedicated period of time?

Communities of practice:
• How would you describe what it is like to go to school here? Do people get along? How do you feel when you are in this learning environment?
• Do you think the teaching-staff are supportive of you and your learning? In what ways/why not?
• Could the learning environment be designed better so that teachers could help you more?

Perceptions of the events that occur during the participatory action research (PAR) projects to occur in each case study school regarding the use of learning environments:
• Questions not yet able to be determined.

Perceptions regarding changes in the learning community that may have occurred due to the PAR projects:
• Questions not yet able to be determined.
Appendix 2: Plain language statements and consent forms

Plain language statement for Principals or nominee

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Dear _____________________________(Principal or host nominated by Principal)

We are interested in working with your school in relation to the research project named above. This student research project is being conducted by Dr Sue Wilks, Dr Dominique Hes, and research higher degree student Ben Cleveland of the Faculty of Architecture, Building and Planning at The University of Melbourne. The purpose of this letter is to inform you formally of the research that we wish to occur, as previously discussed.

This project will form part of an Australian Research Council (ARC) Linkage project which has been approved by the Melbourne University Human Research Ethics Committee and the Department of Education and Early Childhood Development. Dr Peter Stewart, the General Manager of Resources Division, Department of Education and Early Childhood Development, is a Partner in this grant.

Project summary

We wish to gain information that will inform architects about how best to design future middle school learning environments and to inform schools about how best to use these environments to support student engagement in learning. The project is particularly concerned with the interrelated influences that physical space and teaching and learning approaches (pedagogies) may have on student engagement in learning.

The project will also investigate the potential educative value of sustainably designed school buildings. The integration of sustainability education opportunities into the design of middle school buildings may provide students with opportunities to learn about sustainable living practices through their interactions with, and experiences of, the built environment.

Through observation and interviews, information will be collected regarding the lived experience of teachers and students as they use new learning environments that are considered innovative in terms of design for learning and/or sustainable design. Also, where appropriate, the energy, water, and light levels of the spaces will be monitored.
In the initial phase of the study, data collection will include observations of teachers and students as they go about their routines. Later a collaborative approach will be taken wherein the participants (teachers and students) will be invited to join the research process as co-researchers. During this phase of the study the researchers may work with teachers and students to manipulate learning environments. If the school is interested, this could extend to our providing teacher education sessions that aim to aid teachers to modify teaching and learning approaches to suit different styles of learning in the new spaces. Such changes will be intended to facilitate improved use of space to support student engagement in learning. The data collected will be in the form of observational field notes, photographs and interviews with teachers and students, as well as student documentaries. The creation of these documentaries will involve students taking photographs that depict their actions within learning environments and then recording an oral narration discussing their perceptions and experiences of the learning environments. This work will be incorporated into the curriculum and students will be asked to allow the researchers to retain a copy of their documentary. Student documentaries will be used as prompts during interviews. The researchers will take notes and/or audio recordings of interviews. These will be available to participants to read and will only be shared with other researchers on the project.

Your involvement

The potential risks to participants are expected to be minimal, due to the integration of this research into the normal daily practices that occur in each of the case study schools. The time required, and any work asked of teachers and students as co-researchers, will be integrated into their normal daily practice, either into professional development activities (negotiated with you or the teachers involved) or the curriculum (as the school sees fit). It is envisaged that the creation of the student documentaries will take students 2-4 hours and interviews with students will be for no more than 30 minutes. Interviews with teaching staff will be conducted for approximately one hour.

The project will be ongoing for the duration of the 2009 school year and will involve occasional (once or twice per fortnight) contact with or observation by researchers. Usually only one researcher will be present. Observations of normal classes will not disrupt teaching or timetables.

The information gained will be for the researchers’ use only. Their notes, photographs and interview transcripts will be available at all times for participants to view. All primary data collected will be stored at the University of Melbourne in a locked filing cabinet and/or a password protected PC. The final results and findings will be made available to the participant schools in 2011. This will be in the form of a hardcopy document. If participants require an electronic version of published results, then this will be made available upon request. The names of the case study schools and the names of participants will not be used in the research findings. The schools and participants may be referred to by alternate names, or pseudonyms, in publications arising from the research. Data will be stored for a minimum of five years after the date of any publication or public release of the work of the research. Audiotapes and multimedia presentations will be disposed of in accordance with The University of Melbourne code of conduct for research.
Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw your permission at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice. You are assured that your decision will have no effect or any implications on you either professionally or personally with the institution or the researchers.

Should you require any further information, or have any concerns, please do not hesitate to contact Dr Sue Wilks, Dr Dominique Hes, or Ben Cleveland on ph: 8344 0097 or at the Faculty of Architecture, Building and Planning, the University of Melbourne, Parkville Victoria, 3010.

Should you have any concerns about the conduct of the research project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073, or fax: 9347 6739.

If you would like to participate in this research project and are prepared to permit your staff and students to participate, please read carefully and sign the enclosed consent form and return it to Ben Cleveland at Faculty of Architecture, Building and Planning, the University of Melbourne, Parkville Victoria, 3010.
Plain language statement for adult participants

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Dear _______________________

We are interested in working with your school in relation to the research project named above. This student research project is being conducted by Dr Sue Wilks, Dr Dominique Hes, and research higher degree student Ben Cleveland of the Faculty of Architecture, Building and Planning at The University of Melbourne. The purpose of this letter is to inform you of the purpose of the research project and to invite you to participate in this research. You are not automatically expected to participate. It is entirely voluntary.

This project will form part of an Australian Research Council (ARC) Linkage project which has been approved by the Melbourne University Human Research Ethics Committee and the Department of Education and Early Childhood Development. Dr Peter Stewart, the General Manager of Resources Division, Department of Education and Early Childhood Development, is a partner in this grant.

Project summary
We wish to gain information that will inform architects about how best to design future middle school learning environments and to inform schools about how best to use these environments to support student engagement in learning. The project is particularly concerned with the interrelated influences that physical space and teaching and learning approaches (pedagogies) may have on student engagement in learning.

The project will also investigate the potential educative value of sustainably designed school buildings. The integration of sustainability education opportunities into the design of middle school buildings may provide students with opportunities to learn about sustainable living practices through their interactions with, and experiences of, the built environment.

Through observation and interviews, information will be collected regarding the lived experience of teachers and students as they use new learning environments that are considered innovative in terms of design for learning and/or sustainable design. Also, where appropriate the energy, water, and light levels of the spaces will be monitored.
Your involvement
In the initial phase of the study, data collection will include observations of teachers and students as they go about their routines. Later a collaborative approach will be taken wherein the participants (teachers and students) will be invited to join the research process as co-researchers. During this phase of the study the researchers may work with teachers and students to manipulate learning environments and, if the school is interested, modify teaching and learning approaches to suit different styles of learning. Such changes will be intended to facilitate improved use of space to support student engagement in learning. The data collected will be in the form of observational field notes, photographs and interviews with teachers and students, as well as student documentaries. The creation of these documentaries will involve students taking photographs that depict their actions within learning environments and then recording an oral narration discussing their perceptions and experiences of the learning environments. This work will be incorporated into the curriculum and students will be asked to allow the researchers to retain a copy of their documentary. Student documentaries will be used as prompts during interviews. The researchers will take notes and/or audio recordings of interviews. These will be available to participants to read and will only be shared with other researchers on the project.

The potential risks to participants are expected to be minimal, due to the integration of this research into the normal daily practices that occur in each of the case study schools. The time required, and any work asked of teachers and students as co-researchers, will be integrated into their normal daily practice, either into professional development activities or the curriculum (as the school sees fit). It is envisaged that the creation of the student documentaries will take students 2-4 hours and interviews with students will be for no more than 30 minutes. Interviews with teaching staff will be conducted for approximately one hour.

The project will be ongoing for the duration of the 2009 school year and will involve occasional (once or twice per fortnight) contact with, or observation by, researchers. Usually only one researcher will be present. Observations of normal classes will not disrupt teaching or timetables.

The information gained will be for the researchers’ use only. Their notes, photographs and interview transcripts will be available at all times for participants to view. All primary data collected will be stored at the University of Melbourne in a locked filing cabinet and/or a password protected PC. The final results and findings will be made available to the participant schools in 2011. This will be in the form of a hardcopy document. If participants require an electronic version of published results, then this will be made available upon request. The names of the case study schools and the names of participants will not be used in the research findings. The schools and participants may be referred to by alternate names, or pseudonyms, in publications arising from the research. Data will be stored for a minimum of five years after the date of any publication or
public release of the work of the research. Audiotapes and multimedia presentations will be disposed of in accordance with The University of Melbourne code of conduct for research.

Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw your permission at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice. You are assured that your decision will have no effect or any implications on you either professionally or personally with the institution or the researchers.

Should you require any further information, or have any concerns, please do not hesitate to contact Dr Sue Wilks, Dr Dominique Hes, or Ben Cleveland on ph: 8344 0097 or at the Faculty of Architecture, Building and Planning, the University of Melbourne, Parkville Victoria, 3010.

Should you have any concerns about the conduct of the research project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073, or fax: 9347 6739.

If you would like to participate please read carefully and sign the enclosed consent form and return it to your school's administration for collection by the researchers.
Plain language statement for student participants and their parents

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Dear _______________________

We are interested in working with your school in relation to the research project named above. This student research project is being conducted by Dr Sue Wilks, Dr Dominique Hes, and research higher degree student Ben Cleveland of the Faculty of Architecture, Building and Planning at The University of Melbourne. The purpose of this letter is to inform students and their parents about the project and to invite students to participate in this research. Students are not automatically expected to participate. It is entirely voluntary.

This project will form part of an Australian Research Council (ARC) Linkage project which has been approved by the Melbourne University Human Research Ethics Committee and the Department of Education and Early Childhood Development. Dr Peter Stewart, the General Manager of Resources Division, Department of Education and Early Childhood Development, is a partner in this grant.

Project summary
We wish to gain information that will inform architects about how best to design middle school learning environments and to inform schools about how best to use these environments to support student engagement in learning.

The project will also investigate the potential educative value of sustainably designed school buildings. The integration of sustainability education opportunities into the design of middle school buildings may provide students with opportunities to learn about sustainable living practices through their interactions with, and experiences of, the built environment.

Through observation and interviews, information will be collected regarding the lived experience of teachers and students as they use innovative new learning environments. Also, where appropriate, the energy, water, and light levels of the spaces will be monitored.

Your involvement
In the initial phase of the study, data collection will include observations of teachers and students as they go about their routines. Later a collaborative approach will be taken wherein the participants (teachers
and students) will be invited to join the research process as co-researchers. During this phase of the study the researchers may work with teachers and students to manipulate learning environments and, if the school is interested, modify teaching and learning approaches to suit different styles of learning. Such changes will be intended to facilitate improved use of space to support student engagement in learning. The data collected will be in the form of observational field notes, photographs and interviews with teachers and students, as well as student documentaries. The creation of these documentaries will involve students taking photographs that depict their actions within learning environments and then recording an oral narration discussing their perceptions and experiences of the learning environments. This work will be incorporated into the curriculum and students will be asked to allow the researchers to retain a copy of their documentary. Student documentaries will be used as prompts during interviews. The researchers will take notes and/or audio recordings of interviews. These will be available to participants to read and will only be shared with other researchers on the project.

The potential risks to participants are expected to be minimal, due to the integration of this research into the normal daily practices that occur in each of the case study schools. The time required, and any work asked of students as co-researchers, will be integrated into their normal curriculum (as the school sees fit). It is envisaged that the creation of the student documentaries will take students 2-4 hours and interviews with students will be for no more than 30 minutes.

The project will be ongoing for the duration of the 2009 school year and will involve occasional (once or twice per fortnight) contact with or observation by researchers. Usually only one researcher will be present. Observations of normal classes will not disrupt teaching or timetables.

The information gained will be for the researchers’ use only. Their notes, photographs and interview transcripts will be available at all times for participants to view. All primary data collected will be stored at the University of Melbourne in a locked filing cabinet and/or a password protected PC. The final results and findings will be made available to the participant schools in 2011. This will be in the form of a hardcopy document. If participants require an electronic version of published results, then this will be made available upon request. The names of the case study schools and the names of participants will not be used in the research findings. The schools and participants may be referred to by alternate names, or pseudonyms, in publications arising from the research. Data will be stored for a minimum of five years after the date of any publication or public release of the work of the research. Audiotapes and multimedia presentations will be disposed of in accordance with The University of Melbourne code of conduct for research.

Please be advised that student participation in this study is completely voluntary. Should you wish to withdraw your permission at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice. You are assured that your decision will have no effect or any implications on you either professionally or personally with the institution or the researchers.
Should you require any further information, or have any concerns, please do not hesitate to contact Dr Sue Wilks, Dr Dominique Hes, or Ben Cleveland on ph: 8344 0097 or at the Faculty of Architecture, Building and Planning, the University of Melbourne, Parkville Victoria, 3010.

Should you have any concerns about the conduct of the research project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073, or fax: 9347 6739.

Please note that the researchers have discussed the project with students and made themselves available to respond to questions.

If your child would like to participate, please read carefully and sign the enclosed consent form and return it to your school’s administration for collection by the researchers. Both students and their parents are required to sign.
Consent form for Principals participating in research project

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Name of participant:

Names of researchers: Dr Sue Wilks, Dr Dominique Hes, Mr Ben Cleveland

1. I consent to participate in the research project named above in order to assist with data collection. I am also willing to permit the teachers and students at my school to participate in the above named project if their consent is obtained. I understand that the project involves investigating the influence of innovative and sustainable middle school learning environments on student engagement in learning. The project has been explained to me and I understand that the researchers will observe the events that occur in my school during the 2009 school year. I understand that teachers, students and I may be interviewed and that the interview(s) may be audio recorded. It has been explained to me that interviews with adults will be for approximately one hour and interviews with students will be conducted for no more than 30 minutes. I understand that teachers and students will be required to participate in a project regarding the use of the school's learning environments and that this will involve students creating short (3-5 minute) multimedia documentaries. I understand that the creation of these documentaries is expected to take 2-4 hours and will involve students taking photographs of how they use the learning environments found in our school and recording an oral narration outlining their perceptions and experiences of the learning environments. I understand that some of spaces in my school may be monitored for energy, water, light levels and other environmental parameters. I understand that the time required for students to participate in this research will need to be integrated into the school curriculum, and that the time required for teachers to participate will need to be integrated into their professional practice and professional learning time.

2. I authorise the researchers to use the data collected for the research project named above, which is also referred to under (1) above.

3. I acknowledge that:
   (a) The possible effects of the research project named above have been explained to me to my satisfaction.
   (b) I have been informed that I am free to withdraw from the research project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purposes of research at The University of Melbourne, Faculty of Architecture, Building and Planning
      (d) I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.
      (e) This consent form is to be returned to and retained by the researchers.

Signature: ______________________________ Date: ____________________________

(Participant)

HREC No 0830699.1. 9/2/09 Version 3
Consent form for adult participants in Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments research project.
Consent form for adults participating in research project

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Name of participant: ________________________________

Names of researchers: Dr Sue Wilks, Dr Dominique Hes, Mr Ben Cleveland

1. I consent to participate in the research project named above in order to assist with data collection. I understand that the project involves investigating the influence of innovative and sustainable middle school learning environments on student engagement in learning. The project has been explained to me and I understand that the researchers will observe the events that occur in my school during the 2009 school year. I understand that teachers and students may be interviewed and that the interview(s) may be audio recorded. It has been explained to me that interviews with adults will be for approximately one hour and interviews with students will be conducted for no more than 30 minutes. I understand that teachers and students will be required to participate in a project regarding the use of the school's learning environments and that this will involve students creating short (3-5 minute) multimedia documentaries. I understand that the creation of these documentaries is expected to take 2-4 hours and will involve students taking photographs of how they use the learning environments found in our school and recording an oral narration outlining their perceptions and experiences of the learning environments. I understand that some of spaces in my school may be monitored for energy, water, light levels and other environmental parameters. I understand that the time required for students to participate in this research will need to be integrated into the school curriculum, and that the time required for teachers to participate will be integrated into their professional practice and professional learning time.

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   (d) I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.
   (e) This consent form is to be returned to and retained by the researchers.

Signature: ________________________________ Date: ________________________________

(Participant)

HREC No 0830699.1. 9/2/09  Version 3

Consent form for adult participants in Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments research project.
Consent form for students participating in research project

Project Title: Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments.

Name of participant: ____________________________

Names of researchers: Dr Sue Wilks, Dr Dominique Hes, Mr Ben Cleveland

1. I consent to participate in the research project named above in order to assist with data collection. I understand that the project involves investigating the influence of innovative and sustainable middle school learning environments on student engagement in learning. The project has been explained to me and I understand that the researchers will observe the events that occur in my school, that I may be interviewed (for up to 30 minutes), and that the interview(s) may be audio recorded. I also understand that I will be required to participate in a project regarding the use of the learning environments and that I will be asked to create a short (3-5 minute) multimedia documentary. The creation of this documentary is expected to take 2-4 hours and will involve me taking photographs of how I use the learning environments found in my school and recording an oral narration outlining my perceptions and experiences of the learning environments. I understand that some of spaces in my school may be monitored for energy, water, light levels and other environmental parameters. I understand that the time required to participate in this research will be integrated into my normal school curriculum.

2. I authorise the researchers to use the data collected for the research project named above, which is also referred to under (1) above.

3. I acknowledge that:
   (a) The possible effects of the research project named above have been explained to me to my satisfaction.
   (b) I have been informed that I am free to withdraw from the research project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purposes of research at The University of Melbourne, Faculty of Architecture, Building and Planning
   (d) I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.
   (e) This consent form is to be returned to and retained by the researchers.

Signature: ____________________________ Date: ____________________________

(Student)

Signature: ____________________________ Date: ____________________________

(Parent/Guardian)

HREC No 0830699.1. 9/2/09 Version 3
Consent form for student participants in Engaging spaces: an investigation into middle school educational opportunities provided by innovative and sustainable built environments research project.
Appendix 3: Conferences and seminars attended by the researcher during candidacy

- **2008**
  - School Building Expo - Chicago, USA
  - Council of Educational Planners International (CEFPI) Australasia Regional Conference - Melbourne
  - Home School and Spaces in Between: Child Friendly Cities Symposium - The University of Melbourne, Melbourne*
  - SB08 – World Sustainable Building Conference (Student Sessions) – The University of Melbourne, Melbourne*

- **2009**
  - Building the Education Revolution: CEFPI Forum - Catholic Education Office, East Melbourne*
  - Victorian Curriculum and Assessment Authority, VELS Tertiary Educators Forum, East Melbourne
  - CEFPI Educational Facilities Planning and Sustainability Forum – Hobart
  - Future Proof Your Institution – Why Learning Environments Matter, Seminar, Melbourne
  - British Council for School Environments, National School Environments Week – London, UK
  - 16th International Conference on Learning - University of Barcelona, Spain*
  - School Planning, Design and Construction Conference - Vibe Savoy Hotel, Melbourne*
  - Australian Council for Educational Leaders (ACEL) Conference, hosted in conjunction with CEFPI Australasia Regional Conference – Darwin Convention Centre, Darwin*
  - Talking Spaces Symposium - The University of Melbourne, Melbourne*
  - Learning Spaces Workshop, Department of Education and Early Childhood Development (Victoria), Monash Conference Centre, Melbourne*

- **2010**
  - CEFPI ‘Stuff it’ Seminar – The University of Melbourne, Melbourne*
  - CEFPI Building Connections Conference – Hobart*
  - CEFPI Australasia Regional Conference (participated in collaborative design project that was presented at the conference) – Perth*
  - Talking Spaces 2 Symposium - The University of Melbourne, Melbourne*

- **2011**
  - CEFPI Australasia Regional Conference - Sydney

* Denotes that the researcher also presented at the event.
### Appendix 4: Design principles for innovative middle years’ learning environments

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Recommendation</th>
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</table>
| **Design approach** | - Consider learning environments as constructs of three parts: the physical, social and virtual. Consider each of these components carefully when embarking on new spatio-pedagogical projects.  
- Create learning environments that embody reflexive qualities. This is preferable to designing flexible spaces that only users with high levels of environmental competency can use effectively.  
- Develop deep understandings of desired educational practices and use these to inform design. Developing clear visions of the pedagogical roles that students and teachers are likely to play is particularly important.  
- Consider the influence of space on curriculum and assessment requirements.  
- Allow education models to develop during iterative design processes.  
- Seek contributions from school communities (school leaders, teachers, students, parents) and designers (architects, interior designers, landscape architects) throughout the design process. |
| **Scale/size** | - Ensure that social organisational structures (i.e. student and teacher groupings) inform the scale/size of new learning environments.  
- Consider how many teachers can collaborate effectively when determining social organisational structures.  
- Recognise that learning environments that cater to cohorts of more than 75 students are likely to erode the potential for effective teacher collaboration - although learning communities composed of multiple student cohorts may cater to more students. |
| **Learning settings** | - Create differentiated learning settings that can support whole group communal experiences, medium sized instructional activities, small group collaborative activities, individual reflective activities, and one-to-one teacher-student conferencing.  
- Define individual learning settings using walls, changes to floor and/or ceiling heights, changes to floor coverings, and through the placement of furniture and/or other interior elements.  
- Interconnect learning settings to enable the flow of activity and provide students and teachers with access a variety of physical, social and virtual/online resources. |
| **Circulation** | - Integrate circulation routes into learning areas. |
| **Furniture** | - Select furniture based on pedagogical intentions. Take into account how individual |
items may influence the ways people interact.
- Use a variety of furniture types including fixed and mobile items.
- Include both hard and soft furniture seating options.
- Set aside floor space for students and teachers to work on the floor.

| Technology          | - Provide students with ubiquitous access to computers with internet connectivity.
|                    | - Ensure that students are able to collaborate with partners while working at computers to support a shared dialogue of inquiry.
|                    | - Provide large screen desktop computers and smaller mobile computers or handheld devices to support a variety of computer-enabled learning experiences.
|                    | - Provide teachers and students with access to data projection and interactive whiteboards to enable collaboration and the sharing of learning.

| Storage            | - Incorporate extensive storage for learning materials so that resources may be readily accessed by both teachers and students – especially in resource-rich settings such as wet areas/project spaces.
|                    | - Incorporate lockers into learning spaces to enable students to access their belongings during lessons. This can support the democratisation of the learning situation.

| Display            | - Fit walls with extensive display areas and provide display options for three-dimensional objects.

| Acoustics          | - Consider acoustic performance as a primary concern and incorporate high quality acoustic treatments to reduce sound reverberation and noise levels.

| Visual connection  | - Provide visual connections between learning settings to support the flow of activity and enable teachers to maintain surveillance over students’ activities.

| Light              | - Install blinds so users can control natural light – especially in areas where data projectors and computer screens are to be used.

| Teacher spaces     | - Locate dedicated teacher spaces adjacent to learning environments, rather than within learning environments. Ensure these areas are visually accessible but acoustically separate to enable private conversations to take place.
Appendix 5: Use principles for innovative middle years’ learning environments

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Alignment of practice and space</td>
<td>- Support new education models and practices with purpose-designed learning environments.</td>
</tr>
<tr>
<td></td>
<td>- Adapt curriculum, pedagogy and assessment practices when making the transition from traditional classrooms into new learning environments.</td>
</tr>
<tr>
<td>Curriculum</td>
<td>- Ensure that curriculum frameworks are adaptable so the needs and interests of individual students may be catered for.</td>
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<tr>
<td></td>
<td>- Integrate curriculum across subject areas to enable students to pursue projects that make connections between learning domains.</td>
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<td></td>
<td>- Compose teacher-teams of staff with backgrounds in varied disciplines to support the integration of curriculum.</td>
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<tr>
<td>Pedagogy</td>
<td>- Use project-based, problem-based and inquiry-based pedagogical models to guide student learning.</td>
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<tr>
<td></td>
<td>- Augment constructivist pedagogies with short periods of direct instruction, or targeted teaching, to support student engagement in constructivist activities.</td>
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<td></td>
<td>- Team-teach collaboratively, rather than co-teach in relative isolation from colleagues.</td>
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<td></td>
<td>- Encourage teachers to trial, evaluate and develop constructivist pedagogies – especially during the early stages of occupying new learning environments.</td>
</tr>
<tr>
<td>Assessment and reporting</td>
<td>- Develop assessment and reporting practices that can support constructivist pedagogies.</td>
</tr>
<tr>
<td>Behaviour settings</td>
<td>- Develop distinct behaviour settings within learning environments to support a variety of pedagogical encounters.</td>
</tr>
<tr>
<td></td>
<td>- Develop behaviour setting ‘programs’ through collaboration between teachers and students.</td>
</tr>
<tr>
<td>Geographical engagement</td>
<td>- Relinquish tight control over students’ geographies to encourage higher levels of geographical engagement.</td>
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<tr>
<td></td>
<td>- Provide regular opportunities for students to discuss with teachers how to best use their learning environments.</td>
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<tr>
<td>Ownership, choice and</td>
<td>- Share ownership of space between teachers and students.</td>
</tr>
<tr>
<td></td>
<td>- Allow students to choose the learning settings that will best support their learning.</td>
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<tr>
<td>movement activities.</td>
<td></td>
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<tr>
<td>---------------------</td>
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<tr>
<td>- Enable students to move between learning settings to pursue different aspects of their learning.</td>
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<table>
<thead>
<tr>
<th>Power relationships/behaviour management</th>
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<tbody>
<tr>
<td>- Maintain teacher surveillance over students’ activities to promote appropriate behaviours and student engagement.</td>
</tr>
<tr>
<td>- Encourage students to remind their peers which behaviours are suitable within particular learning settings.</td>
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<tr>
<td>- Develop a socio-pedagogical culture based on democratic ideals.</td>
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</tbody>
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<thead>
<tr>
<th>Technology</th>
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</thead>
<tbody>
<tr>
<td>- Provide students with ubiquitous access to internet enabled technologies.</td>
</tr>
<tr>
<td>- Develop hybrid learning environments that will support student access to information, enable them to use a range of media to present their learning, and extend their learning beyond the campus.</td>
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<table>
<thead>
<tr>
<th>Furniture</th>
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<tbody>
<tr>
<td>- Allow students to rearrange furniture within learning settings if doing so will enhance their learning experience.</td>
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<tr>
<th>Display</th>
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<tbody>
<tr>
<td>- Celebrate students’ work by placing it on display.</td>
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<tr>
<td>- Support teachers and students to develop and contribute to dynamic wall displays that will encourage the democratisation of the learning situation.</td>
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<thead>
<tr>
<th>Learning ‘hum’</th>
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<tbody>
<tr>
<td>- Acknowledge that regular verbal communication between students and students, and students and teachers is vital to constructivist learning.</td>
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<tr>
<td>- Develop some learning settings as quiet/reflective spaces and others as noisy/dynamic spaces.</td>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>- Structure timetables to allow students to participate in a variety of related activities within one period. Periods of up to 150 minutes may be appropriate.</td>
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<tr>
<td>- Provide teachers with sufficient time and support to collaboratively plan units of work with colleagues.</td>
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<tr>
<th>Professional learning</th>
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<tbody>
<tr>
<td>- Engage school leaders, teachers, students and parents in sustainable cultural change. These groups need to understand what changes are to take place and why they are being made.</td>
</tr>
<tr>
<td>- Support teachers with opportunities for professional learning. Focus on middle years’ learning theory, constructivist pedagogies, team-teaching strategies and new spatial usage schemas.</td>
</tr>
<tr>
<td>- Recognise that supporting teachers to adopt new practices may require shifting their value systems and asking them to re-evaluate how students learn.</td>
</tr>
</tbody>
</table>
| - Initiate professional learning prior to moving in to new learning environments and
provide ongoing professional support after teachers have experienced their new spaces.

- Combine external professional learning seminars with regular internal learning opportunities that provide teachers with opportunities to reflect on past and current practices.

- Focus on developing teachers' environmental competencies and their understandings of how to align practice and space once they have experienced their new learning environments.