Changing the Architecture of Educating: 
Towards collaborative school design

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

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Terms
The Victorian Department of Education (DET) was previously named Department of Education and Early Childhood Development (DEECD)
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Preshil
Melbourne Grammar School
St Frances de Sales Primary School
Scuola communle dell'infanzia
fig 01: Three key relationships.
1.0 Introduction

The design of schools in Victoria occurs within a complicated matrix of divergent aspirations of the stakeholder community, changing views on pedagogy and little research to guide architects on the types of environments most effective in facilitating learning, creating a challenging environment for the architect to design within. Through reflection on school architecture projects I worked on over the last 10 years, I identified three key relationships in the school design process. The roles and collaboration between the poles of architecture, pedagogy and school community impact architectural outcomes and recurring issues were identified that may inhibit the development and balance between the three key relationships during the design process. To assist the architect in navigating these issues, I’ve developed a suite of school design tools. These tools provide the architect with strategies and approaches at different stages of design to assist in negotiating the challenges and inherent deficiencies. The tools identify key aspirations at each design stage and evolve with the development of the project. The tools aim to capture and build the relationships between the poles through facilitating and structuring the briefing process with the school, aiming to balance the concerns of the school community, pedagogy and architecture, and aspiring to create effective school architecture.
fig 02: Three key relationship diagram, June 2012.

Commitment to school values and intended role of school in community

Role of architect and architecture

Interpret school community values

Evolve pedagogy into architecture

Balance between school community, pedagogy and architecture

Commitment to a pedagogy

Interaction between teachers and students within space

Relationship between architecture and pedagogy
The problem with school design

School design occurs within a complicated matrix of divergent aspirations of the stakeholder community, changing ideas on pedagogy and uncertainty on the most effective environments to facilitate learning. There are many contributors in the school design process, each with their own ideas and objectives, creating a challenging environment for the architect to design within.

The stakeholder community who come together to design a school, encompass a broad range of contributors, from government, through to representatives of the school community, including teachers, students and their families, each with a different understanding of what a school is (Bonnor 2012). For pedagogy, there are different schools of thought, as well as constantly evolving theories on the most effective way of educating students (Encyclopaedia of the Sciences of Learning 2012). Architecture has a role to play in designing new types of education spaces, in line with current thinking around pedagogy, with government recognising architecture’s key role in facilitating learning (DEECD 2008; DEECD 2009b).

In Australia, government funding for schools between 2000 and 2014 increased by approximately 74 percent (Harrington 2013). Between 2000 and 2012, however, Australia’s international education ranking in standardised testing such as PISA has been declining (Waters et al. 2000, Thomson et al. 2012), in part due to a decrease in education standards, but also due to a rapid improvement in performance in countries in South East Asia. These results have raised concerns over our education system, influencing changes to Australian government school policy to focus on initiatives to improve learning outcomes (Dawkins et al. 2008; DEECD 2012). In evaluating the effectiveness of schools, there is recognition by the government that this is influenced by many factors. ‘New learning environments are always welcome for schools and their communities. However, the most awarded designs will seem to be failures if the activity and behaviours of the people who occupy them are not innovative and characteristic of 21st century education’ (DEECD, 2009c).

As an architect, I’ve spent 10 years working on the architecture of schools with practices including HASSELL, Y2 Architecture and in my own practice. I’ve experienced first-hand the complex environment surrounding school design and observed a range of inconsistent architectural outcomes emerging from what are fairly regulated school procurement processes within the Victorian government school sector. These experiences raised questions around my past school design approaches and prompted the development of the PhD to explore new collaborative approaches to designing school architecture, its relationship with pedagogy and the needs of the school community, with the aspiration of facilitating a more conscious way of working through design issues in my practice.
Research methodology

This research has been conducted within the Design Practice Research program at RMIT, which explores architectural design practice through research into the medium itself (Van Schaik et al. 2011). In By practice, by Invitation: Design practice research in architecture and design at RMIT, 1986-2011, Van Schaik et al describes: ‘The approach thus invited practitioners to look back, to observe current practice and to project forward into future practice (also described as a scholarship cone, the base of which was previous practice, the middle of which was current practice, and the tip of which pointed to future practice)’ (2011, p. 15). In Design Research, Downton looks at the ‘relationship of research to design and considers them both as ways of inquiring about the world and as ways of contributing to individual knowing and disciplinary knowledge’ (2003, p. 2). He discusses the distinctions made by the terms ‘research for design’, ‘research about design’ and ‘research through design’ and argues that ‘Design is a way of inquiring, a way of producing knowing and knowledge; this means it is a way of researching’ (Downton, 2003 p. 1).

These approaches described by Van Schaik and Downton have been used as methods for this research. By reflecting on past practice projects, observing current practice, and situating the work within a broader context of research, a community of practice and the scrutiny of peers, the research has shifted my understanding of the role of the architect in school design, informing the development of a new approach to the design of schools.

The understanding of the context in which the work occurs aims to encourage ‘innovators who are changing the ways in which we think about architecture’ (Van Schaik 2005, p. 8). The research has encouraged me to shift from working as an emerging architect employed by other practices, to developing my own identity as an architect, with a particular interest in and approach to school design.
Relationships in school building

With the broad range of concerns and differing expectations placed on school design, I believe architects need support in navigating this space and curating these concerns, with an approach to design that can assist in working through the different objectives of the school community, architecture and pedagogy (fig 01-02). I created the three key relationship diagram early in the PhD research and it summarises findings from my Reflective Practice and School Procurement chapter. The diagram represents how the school design process can work effectively in an ‘ideal’ project.

The school community, architecture and pedagogy are viewed as three different ‘poles’, which push and pull each other in the school design process. In the context of this diagram, the school community pole includes students and their families, teachers, school leadership, councils and government bodies as the main stakeholders contributing to school design. The pedagogy pole describes the method and teaching practices used by a school for the education of its students. The architecture pole includes the role of the architect as designer and the architecture of the learning environment. In the diagram, the role of each pole in the school design process is outlined and, in an ideal design process, a balance exists between the three poles, with each pole actively contributing to the design.

Broadly, the PhD research investigates this diagram and explores each pole and the interactions and relationships between the three poles through a process of reflective practice, case study analysis and design, the conditions that manifest the process of providing school architecture in Victoria.
Community

School plays a broad role in society – a role far broader than that outlined in the school community pole. Australian education policies, such as Towards Victoria as a Learning Community (DEECD 2012), outline the vital role that education plays in our society, benefiting individuals, families and the country as a whole. For individuals, a strong education greatly improves career opportunities and the capacity for a healthier and higher quality of life. For families, schools are included as part of long-term strategies to build stronger communities, particularly in low-socioeconomic areas, in breaking the cycle of intergenerational social disengagement (fig 03-05). For the country, an educated population contributes to a more civil society, lowering the need for welfare and reducing crime. Achieving a higher level of education also creates greater productivity in the workforce, contributing to Australia’s ability to be more competitive on a global scale.

The Australian government recognises the importance of schools and, historically, government has played a central role in ideas surrounding nation building, with schools included as essential public buildings in the establishment of local communities (Lewi & Nichols 2010). ‘Politicians, too, often speak of building community through the provision of public infrastructure and services, thus assuming that the creation and management of physical places is a means of fostering community cohesion’ (Lewi & Nichols 2010, p. 8).

The Building the Education Revolution (BER) program initiated by the Australian government, as part of the National Building Economic Stimulus Package after the 2008 global financial crisis, is the most recent example of large-scale investment in public infrastructure through school buildings. The $16.2 billion program provided around 24,000 school architecture projects across government, catholic and independent school sectors.

In Victoria, there were 2904 projects at a cost of $2.5 billion, with mixed opinion on the success of the program (fig 06). Research in the PhD seeks to expand my engagement with the idea of community in this context and to explore ways to work with the school community as a key part of the design process.
While the financial investment in schools through the BER program was welcomed amongst school communities, the speed of the procurement was hastened through the use of school template designs and guidelines to manage the process. Unlike other government funding programs for schools, such as the Building Futures Program and the Leading Schools Fund, the BER process provided limited options and opportunities for consultation with schools or the ability to adapt projects to a school’s individual needs (Gan & Newton 2012). The BER program highlights some of the tensions and different aspirations amongst the stakeholder group. Through the three key relationship diagram the importance of the school community became paramount to the design process.
Pedagogy

The development of the internet and advances in information and communication technologies are rapidly changing the world, creating uncertainties as to the types of skills future students may require and expanding how knowledge is accessed and obtained, generating new possibilities for delivering education (Dawkins et al. 2008). Governments around the world have been struggling to recognise what these changes mean and how they will educate students for a different future. In Australia, the *Melbourne Declaration on Education Goals for Young Australians* (Dawkins et al. 2008) set out some of the perceived challenges for the future of education and the types of skills required. In an increasingly global world, there is a need for a greater understanding of cultural diversity and skilled workers, with further training or tertiary education post-secondary school seen as increasingly essential. There is also an emphasis on developing problem-solving and creative abilities to address complex economic, social and environmental issues. The big question for architects is how they might contribute to this discourse through the design of learning environments.

For the **pedagogy pole**, there are many theories on the most effective way of teaching students. The *Encyclopaedia of the Sciences of Learning* (2012) attributes the 20th century as the ‘century of the psychology of learning’, with the development of many new learning theories. These shifts can be radical, as learning theory develops to cater for a growing range of needs (Dudek 2000). This can also result in theories being implemented before there’s been an opportunity to research and develop how they work in detail, resulting in the school needing to figure out how to most effectively teach in new learning environments once they occupy the finished spaces (Prain 2014). In the **three key relationship** diagram, pedagogy plays a critical role in the design process and the PhD research provides the opportunity to extend my understanding of pedagogy beyond my practice experience.
After years of working in the sector I understand the pressures on architects to design schools that respond to the needs of individual school communities within the constraints of DET timeframes and traditional methods of procurement. With knowledge gaps in the specific connections between pedagogy and architecture and the potential for architecture to contribute in this area, the PhD research seeks to develop a deeper understanding of these issues.

In Victoria, the DET has been shifting from teacher-directed learning in a traditional classroom (fig 07) to student-centred pedagogies, requiring more complex spatial arrangements (DEECD 2009b). This has created opportunities for architects to re-imagine schools and learning spaces, with the need for a greater variety of learning spaces to facilitate current teaching practices, and the capacity to accommodate new pedagogies (fig 08-09). A school may be designed to last more than 30 years, but it needs to accommodate a curriculum and pedagogy that is revised far more regularly (Dudek 2000).

There are challenges in identifying the impact of architecture, given it is just one of many contributing factors that may impact student learning outcomes, such as individual skills, home environment and socioeconomic status. These issues are discussed in the 2011 DEECD literature review on the Research into the connection between built learning spaces and student outcomes (Blackmore et al. 2011). This review found ‘a real paucity of empirical evidence in this field’ (DEECD 2009a), with student learning outcomes often not the focus of many studies in this area. While historically not well understood, in 2013, a UK study, A holistic, multi-level analysis identifying the impact of classroom design on pupil’s learning (Barrett et al. 2013), demonstrated a 25 percent improvement in student learning when specific spatial characteristics were present. This study was well publicised, providing empirical evidence of the link between architecture and improved student learning outcomes.

Architecture

In Victoria, the Department of Education and Training has been concerned that the changes in the direction of education and subsequent changes to pedagogy, organisation, curriculum and assessment, may need particular types of learning environments to facilitate new types of learning (Blackmore et al. 2011). This is linked to an increased awareness of research on the relationship between architecture and pedagogy in creating effective school environments (DEECD 2009b). While the positive role architecture can play in creating education environments is well recognised, its ability to directly contribute to raising student learning outcomes is an under-researched area.

There are a broad range of expectations placed on architects during the school design process and, through my research, I am interested in gaining a deeper understanding of the issues that lead to more effective school design in my practice. Through the three key relationship diagram I’ve looked at the role that each pole plays and the importance of achieving a balance between the different objectives of the school community, architecture and pedagogy, to positively influence the school design outcome.
Proposition – School design tools
Through research it became increasingly clear that architects would benefit from a defined set of approaches in the form of design tools. The PhD research captures this exploration and proposes a set of design tools to assist in creating a hierarchy of ideas and priorities to navigate the complex matrix of school design. The school design tools recognise that school design is not just about creating architecture, but developing the three key relationships between the architecture, school community and pedagogy, and the role these poles play in contributing to school architecture.

The proposed tools support the development of the design brief and enrich school architecture projects. The PhD maps a proposition that uses the school design tools to understand and implement effective school architecture.

The ambition for the school design tools is to capture and build these relationships through facilitating and structuring the briefing process with the school, providing strategies and approaches to the recurring issues identified in past school projects. The research revealed the need for a multi-pronged approach to school design. The school design tools help to identify key aspirations and objectives at each stage and work in a loop-type process that evolves with the development of the project (fig 10). The tools work to reveal more detailed information in the school design process and to assist the architect develop a deeper understanding of the needs of a specific school community.

This is not a one-size-fits-all approach to design, where design outcomes can be transferred across school communities. While the tools focus on the participation and interaction with the client, the school design tools do not emphasise participatory design processes as discussed by Jeremy Till in Architecture and Participation (2013), as the process is not prioritised above the design outcomes. Rather, I’m interested in design that responds to the particular needs of an individual school community, developed through a design process that encourages collaboration between the three key relationships. The process itself, of using the school design tools, is not the objective, but the deeper level of understanding the tools can garner to inform a more effective design response.
The *school design tools* have been developed from research and my experience in school design within the Victorian government sector, and the context in which design occurs within this. While the use of the tools may have a wider application to design professionals working in other school sectors, such as catholic, independent or interstate, they would potentially need adapting to meet specific needs.

I’ve sought to contextualise my research by identifying appropriate peers working in this area, such as school design consultant, Mary Featherston, architect Alistair Blythe, ‘design thinking tools’ by Nesta UK and the Stanford Design Innovation Process. These works are discussed in the School Design Tools chapter.

fig 10: School design tool loop.
Contribution to knowledge
The PhD research contribution to knowledge in the field of school architecture captures the exploration of designing schools to reveal nuances in the approach to school design that impacts the architectural outcome. Through identifying these factors, links are made between the three key relationships in the school design process and their areas of influence within the broader context of school design. The research shows connections between multiple approaches to the development of the architectural brief and generating a deeper understanding of school design. The PhD proposes a set of school design tools as a vehicle to assist in facilitating the collection and prioritisation of the concerns from the school community and pedagogy poles and how they inform the architecture pole. Specifically, the contribution sits in four areas.

1. Identification of deficiencies in the Victorian school design process
This research identifies the importance of achieving a balance between the three key relationships during the school design process to create effective school architecture, as well as deficiencies that can challenge and inhibit this.

The Victorian Department of Education and Training (DET) encourages schools to develop pedagogy that respond to the particular context of the school, however it’s challenging for schools to develop and articulate their own direction, with limited experience in the school design process. There is a need for pre-briefing work by the school community to develop the school identity and the pedagogy, in collaboration with the architect, so they can inform the architecture. There are also issues with lack of a common language between the architect and school community, with the architect viewing schools spatially, and the school from a pedagogical perspective. Bridging the gap between the two areas, where they can inform and respond to each other, is important. Further, there are difficulties in identifying and describing the relationship between architecture and pedagogy, with little research and clear findings to guide architects in the design of schools.
2. Relationships in the school design process

The investigations into the relationships between the architecture, pedagogy and school community poles reveals a deeper understanding of the complexities of these relationships, recognising the blurred edges, boundaries and areas of potential interaction between the three poles. The research has shown the importance of aspiring to create a balance between the three poles during school procurement and the influence this can have on the development of the architecture. Each pole has both a dependent and independent role to play during the school design process.

For the architecture pole, the dependent role is in the development of the relationship with the pedagogy and school community poles, where in an ideal design process the development of the architecture evolves from an understanding of the pedagogical practices intended to be used by the school and the identity of the school community. The independent role for the architecture pole is in the practice of architecture, where the architect has specialised knowledge of the role of the architect, the medium and the delivery of the architecture. The architect has professional responsibilities that need to be followed within the design process and a deeper understanding of the language of design than the other stakeholders involved in the school procurement process.

The dual roles work in a similar manner for the pedagogy pole, where the dependent role of pedagogy necessitates an understanding of the identity of the school community and the values they have for learning. This includes an appreciation for how the architecture can participate in prompting and enabling the intended pedagogical practices with the students, so this can inform the architecture. Likewise, the independent role of the pedagogy pole lies within the specialised knowledge of the teachers and their practices in educating students, and some teaching practices can occur in many different types of spaces. Architects and some members of the school community can have limited understanding of pedagogy, having not been trained in this subject area.

For the school community pole, the dependent role on the pedagogy pole is how the school identity and values translate into pedagogical practices with the students. There’s also a dependent relationship with the architecture pole, where the values of the school identity can be communicated and represented through design. The independent role for the school community pole is to develop the school values and identity through the specialised knowledge of its stakeholders and evolving the shared beliefs as a school community. The architect can assist in facilitating this process and can inform the school community how aspects may inform the architecture, but it’s not the role of the architect to enforce the development of a particular school identity.

In summary, an understanding of the complexity of the relationships between the poles can assist in developing effective working relationships during design, whereby the three poles acknowledge and respect the dependent role they play in the project, as well as each other’s areas unique independent areas of expertise.
3. Identifying the need for multiple approaches to school design

Through research and reflection on the school design process, I recognised the limitations of different types of engagement with the school community I had used in past school projects. It seemed that a broader range of approaches was required to facilitate a deeper understanding of the school and the development of the brief. The architect needs to be flexible in how they approach school design, adapting the use of the school design tools for each school community, rather than adopting a one-size-fits-all strategy.

4. School design tools for the architect

The development of a new method of working in my practice in the form of school design tools work in a similar way to a microscope, acting as a device to reveal a more detailed understanding of the relationships between architecture, pedagogy and school community. The school design tools aren’t about asking specific questions, but developed from the perspective of ‘what is the aim of the tool, what am I trying to do or understand’. All of the school design tools facilitate new ‘roles for the architect’ in working with the school in the development of the brief and the school design process.

The school design tools have been developed to provide a new methodology for working in my practice, but could provide insight to other architects working in the area of school design. I have experienced a range of school design methodologies while working with four different architecture practices in Victoria and through the PhD I’ve recognised how school design processes have at times, excluded important information. For example, briefing information that we didn’t understand was set aside, disregarding the complexities of the pedagogy or school community that was unfamiliar.

The school design tools aim to provide ways of bridging communication gaps between the architecture, school community and pedagogy poles, enabling a deeper understanding of the concerns to inform the development of the architectural brief.
How to read this document

The development of the architecture, school community and pedagogy poles proposed in Chapter 1.0 Introduction are discussed in more detail in Chapter 2.0 Reflective Practice and School Procurement.

The next three chapters go into further detail on each of the three key relationship poles and expand on the issues identified in the research that the school design tools respond to. Chapter 3.1 Architecture focuses on the role of the architect, the challenges, and why the tools are needed from an architecture perspective. Chapter 3.2 Pedagogy is centred around the relationship between architecture and pedagogy and identifies how the tools can assist the architect and school community with the challenges in developing a deeper understanding of a school's pedagogy and how it can inform the architecture. Chapter 3.3 School Community reveals the challenges and issues experienced by Sandringham College in the development of new school architecture. The strategies and approaches used in the Masters of Architecture Design Studio, the Facades Project and School Design Advisor role, together inform the basis for the development of the school design tools.

Chapter 4.1 School Design Tools discusses precedents and outlines the development of the school design tools. In Chapter 4.2 Sandringham Project the school design tools are used to design the Sandringham Project. This provides insight into the application of the school design tools, how they work in practice and reflection on how they could evolve to become more effective.

Chapter 5.0 Conclusion reflects on the initial objectives of the PhD research and the development of my understanding of the relationships between the three poles and the use of the school design tools.

Chapter 6.0 Exhibit includes the presentation of the PhD at the RMIT Practice Research Symposium at the conclusion of the research.

The project sheets in the Appendix provide an overview of the school practice projects completed with HASSELL and Y2 Architecture. These provide further background information on the projects discussed in each chapter.

To assist in the reading of the PhD, drawings and images that I have not authored, appear on a grey background.
fig 11: Three key relationships research map. Projects completed through PhD.
Reflection

While research such as the UK study, *A holistic, multi-level analysis identifying the impact of classroom design on pupil’s learning* (Barrett et al. 2013), demonstrate a link between improved learning outcomes and architecture, there is a knowledge gap in the practical application of how this research can inform architects in the school design process to design more effective schools (effective schools – term used in DEECD 2008).

Through experience in practice and research within this PhD, I believe that to improve the role that the environment contributes to education and to increase our understanding of the relationship between architecture and improved student outcomes, architects need to expand their methods of working. As recent history has shown, it’s not about how much we spend on new schools, but careful consideration of how we spend, that will progress our school design process forward and allow us to design more effective school architecture.
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2.0 Reflective Practice and School Procurement

The Reflective Practice and School Procurement chapter reflects on school projects undertaken at HASSELL and Y2 Architecture, prior to commencing the PhD research, with a focus on the relationships between the architect and key stakeholders in the school design process. These projects are compared with exemplar school projects across government, catholic and independent school sectors. My research interest focused on the different school project outcomes that were produced under similar circumstances. Through comparative analysis diagrams of my projects and exemplar precedents, I looked to identify possible consistencies across all projects that could be impacting architectural outcomes. Through this research I was able to identify three key relationships in the school design process with the study of these working relationships shaping and informing the research directions of my PhD.

Introduction

In Victorian government school design, the Department of Education and Training (DET) manage and regulate the school procurement process through a standard set of guidelines and regulations for the architect. These resources aim to provide a level of consistency in the delivery of the architecture of schools and ensure minimum standards are met. These documents include the Capital Works Procedures Manual (DEECD 2011), regulating the procurement process, the Building Quality Standards Handbook (DEECD 2016) for minimum building standards and Pedagogy and Space (DEECD 2009b), which provides guidelines on the potential relationship between architecture and pedagogy in school design (fig 01). Consultation with the school on the development of the architecture is included as part of this design process, with the level of involvement and how this is undertaken determined between the client, key stakeholders and the architect for each project.

While government schools are produced within the same system, I observed a range of architectural outcomes within practices where I worked and across the government school sector. There is significant variation in how projects are structured, how decision-making processes are managed and the interaction between key collaborators. In the development of the brief too, there is a range of approaches, with different levels of consultation between the architect and school, with gaps in how briefing information is collected and manifested within the architecture. Accolades are awarded to some architects for school design projects, while similarly skilled practices miss the mark. These observations raised questions on the nature of these guidelines and regulations, their focus and, whether or not important issues may be overlooked in the school design process.

I became interested in understanding these variations and the factors that could be impacting the outcomes of the school projects produced, while following the same procurement guidelines. Was the difference simply in the skill of the architect or were other factors coming into play? To understand this, I started to reflect on my school architecture projects, mapping the project hierarchies and interactions between the client, key stakeholders and the architect in the design process. Comparative analysis diagrams of my school projects and award-winning exemplar school projects across government, catholic and independent school sectors were produced, to contextualise my analysis and to see what other architects were potentially doing differently across each area. The selected exemplar projects have won awards from a range of bodies across architecture and education. The values of these awards aren’t investigated as part of this process, but considered in the context that these select schools are held up as exemplary within school architecture. The diagrams of my own school projects were informed through reflection on the design process in my practice experience with HASSELL and Y2 Architecture. The exemplar school project diagrams were informed by interviews with the architects, designers and school principals, published documentation in architectural journals, newspapers, media and site visits to the schools.
In the comparative analysis diagrams, I was interested in the different process used in each project, with a focus on three aspects. Firstly, the role each party played in the procurement process. Secondly, how they interacted with other collaborators and, thirdly, how each collaborator influenced the development of the brief that informed the architecture. The parties involved included Victoria’s Department of Education and Training in its role as client, financier and key stakeholder in the design process. The project manager and their impact on the delivery of the project. The role of parents and the surrounding community of the school. The school principal’s role in the design process as part of the client group. The role of an education consultant in advising on pedagogy. The role of the architect and the concerns that shape the architecture, including design directions and school guidelines. Lastly, the role of the builder and the quality of the architectural outcome. The collaborators are colour coded consistently across the set of diagrams, assisting in comparison, with annotations between the different parties, providing further insight into the nature of the relationship within the project team.

As noted in the Introduction, a broad range of aspirations and objectives exist among stakeholders, with each pulling the project in different directions. This creates challenges for the architect in establishing a clear project brief and creating hierarchies amongst the concerns in the development of the architecture. An aspiration of the comparative analysis diagrams is to assist in identifying these concerns so they can be understood and inform an approach to school design.

The aim of the diagrams, and comparison, is to identify possible consistencies across projects that could be impacting the architectural outcome. This includes the types of representation from the client, key stakeholders and architect in the design process and the development of the brief to inform the architecture. The observations and reflections on the diagrams are discussed through the various school projects, which highlight the complexities of the relationships in the school design process.
fig 02: Examples of comparative analysis diagrams
School community

The school community is made up of various stakeholders, who have different aspirations and motivations for the project within the school design process. In my experience, it is often challenging for the various stakeholders to unite together to achieve shared project outcomes. The school community stakeholders who actively contribute to the design process include students, families, teachers, principals, school council and the Department of Education and Training (DET). The DET represents the Victorian government, implementing its education policy and driving the direction towards improving the delivery of education (DET 2015). The DET manage the allocation of funding to projects and ensure they adhere to its guideline documents, playing an active part in the school design process through representation on design review committees and final project approval. Through this role, the DET can look at the bigger picture of where the design of an individual school fits within the broader education agendas of the Victorian government, through to the micro level of participating in the design process with school committees.

The school works with the DET in the design process, representing the interests of the school itself, including students, teachers, principals and parents. As part of government guidelines, the school’s role is to oversee and contribute to the design process with the architects and endorse the final designs (DEECD 2011). The school can advise on the values of the school community and its pedagogy, and can assist in briefing the architects through participation in briefing and providing education rationales. The school itself nominates its own representatives to participate in the school design process, from design review committees to more directly engaging with the architects.

Within the development of school architecture, the DET or the school may initiate a stronger role or balance of power within the design process. Whether the project is led from ‘the top down’ through the DET leadership or driven by the school, it shapes the direction of the project and its outcome. The Bendigo Regeneration Project (BRP) I worked on at HASSELL is an example of the DET taking a strong lead through a politically driven project. The project aimed to develop a new school identity and to transform existing school communities through a new vision for education developed through the Bendigo Education Plan (BEP 2005) (fig 02). It included four new schools and aimed to address social issues within the Bendigo community and to unify student demographics, with a focus on ensuring the needs of the local Bendigo youth were met, providing access to dynamic learning infrastructure and the revolution of learning methods (BEP 2005) (fig 03-07). For the schools, the radical changes proposed by the Bendigo Education Plan created challenges during the design phase, with some resistance to change. Once the schools were complete, there were clear gaps in the pedagogical intent and the actual use of learning spaces, with the school trialling different ways of using the spaces to understand how to optimise learning. This is discussed further in the Pedagogy chapter.
fig 03: Bendigo Regeneration Project comparative analysis diagram. Three Bendigo schools combined onto the two sites of Bendigo South East College and Crusoe Secondary College.

fig 04: Bendigo South East College, 2009, HASSELL. Year 7 learning community. One of four schools in Bendigo Regeneration Project.

fig 05: Bendigo South East College, 2009, HASSELL. Library, Administration and Food Technology.

fig 06: Crusoe Secondary College, 2009, HASSELL. Learning community. One of four schools in the Bendigo Regeneration Project.

fig 07: Crusoe Secondary College, 2009, HASSELL. Learning community.
The Ballarat South Community Health and Learning Precinct by Y2 Architecture (fig 08-09) was also developed with strong leadership from the DET, with aspirations to provide for the lifelong learning needs of the whole community, as well as social infrastructure for the region. The DET collaborated with the health department and local councils to coordinate the provision of a range of community services on the school site. The intention being that through providing support services to families, the cycle of intergenerational social disengagement can be broken in a low SES area through building a stronger community.
The BER projects also used the 'top down' approach, with project managers taking the lead role in the school's procurement process, managing the architects, who had a reduced scope of works. In the Mt Egerton Primary School extension (fig 10-12) by Y2 Architecture, the project manager had the central communication role. The architect's role was focused on working with the client for design resolution and drawing production for the project manager to run the construction phase. The BER projects were delivered in shorter timeframes than standard procurement processes used on Victorian government schools, where there's usually more time allowed for consultation and input from the school. This was challenging for the architects and, at times, frustrating for the school, having to understand the design process and very quickly provide design feedback.
In other projects, the school has taken a stronger lead in the development of the architecture, such as Mt Ridley P-12 College (fig 13-15) and the Keysborough Springvale Regeneration Project (fig 16-17), both designed by Y2 Architecture. In these schools, the school principal played an active role in briefing the architects and shaping the direction of the project. The principal also played a role in uniting the teaching staff to positively contribute to the project. With the end users on board, there was a smoother transition into the occupation of the new architecture and a closer alignment between the actual use and the design intent.

When schools receive funding for new buildings, it generates opportunities to review school identity and, if beneficial, reposition the public perceptions of the school through new architecture. This is particularly evident within small regional communities, where the school plays such a strong role within the local community. This can be seen in the Bendigo
Regeneration Project, where there is a varied socioeconomic background within the school communities and, combining three schools onto two school sites, provided an opportunity to bridge these demographics. The new school architecture creates a new aesthetic image for each school, breaking down perceptions within the community of ‘rich’ and ‘poor’.

In the Mt Egerton Primary School, the new building is an extension to an existing Victorian-era two-room school house. To differentiate between the existing and new architecture, I designed a modern flat roof extension. This was also in response to the difference in materials. The existing school was all timber construction, including windows and cladding. The extension, in keeping with DET guidelines for low-maintenance materials, included colorbond cladding and metal windows. However, the school rejected the modern aesthetic and requested that the new school architecture mimic the adjacent existing Victorian era building. The school wanted to ‘fit in’ with the local buildings, which it was argued included no modern architecture. In response, the design was adjusted to include a flat roof and glazed transition area to assist in visually breaking the awkward jump between the traditional and modern construction. For the school community, this was seen as a closer representation of their school identity.
The development of school identity can be seen in a number of exemplar projects, with a strong sense of identity potentially increasing the school's ability to articulate ideas and shape the direction of the architecture. In the development of Dandenong High School by Hayball (fig 18-20), the school spent a year conducting education research and developing its brief. Using a collaborative approach with the project team, the school developed a strong understanding of its values and how they related to its principles and teaching practice (refer diagram p118). By allowing the school community's shared vision to drive the architecture, a strong and consistent link between the values of the school community, pedagogy and architecture was established.

At Preshil, the school community have a strong sense of their school identity, with the values of compassion and social justice embedded in their teaching philosophy, established in the 1930s by the school founder Margaret J R Lyttle. ‘It is an approach
to education that recognises each child as an individual, with their own unique talents and traits that we value and nurture’ (Preshil nd, p. 1). Preshil aims to encourage their students to actively participate in their education and take responsibility for shaping their own future. ‘Choice with responsibility is a powerful combination – one that fosters self-discipline, maturity, resilience, confidence, initiative and courage in every child’ (Preshil nd, p. 1). At Preshil, they have a very clear understanding of the values they’re aiming to instil in their students, which shapes their approach to education and the experience of school they create for their students. This informed their approach to the architecture, designed by Kevin Borland in collaboration with the children. The learning spaces at the Arlington Junior School aim to inspire the children’s imagination, sense of wonder and discovery with the surrounding landscape as an extension of the indoor learning spaces (fig 21-23).
A sense of their school identity can be seen in St Francis de Sales Primary School which aims to cultivate an interest in lifelong learning for its students. The school values of 'inclusivity, learning excellence, and a community where relationships are valued and built upon' (SFS 2016), informs the approach to the pedagogy, 'where every child will progress developmentally according to his or her interest in learning, ability and their potential to learn'. This is supported by the design of the open plan learning spaces, which provide flexibility and the capacity to differentiate and personalise learning in response to the needs and learning styles of each student (fig 24-26).
Melbourne Grammar School also has a strong sense of school identity and believe that ‘education is fundamental to making positive change for individuals, groups, communities and society as a whole’ (MGS 2016). The school aims to develop in their students the ‘whole person: intellectually, physically, emotionally, psychologically, and socially and spirituality’ (MGS 2016). These values underpin their approach to education, with an emphasis on fostering ‘academic achievement through a broad and challenging curriculum that enables students to explore their own identities and strengths’ (MGS 2016). The school has an appreciation for the benefits of investing in good school architecture to represent and promote the school, engaging award-winning architects, such as Peter Elliott and John Wardle (fig 27-29).

fig 27: Melbourne Grammar School comparative analysis diagram.


The development of a strong sense of school identity that can inform a design brief and the development of the architecture relies on how the school organises itself in the design process. The project type can impact on the ability for this to occur. In the case of regeneration projects, multiple schools are combining onto a reduced number of campuses with school closures. The ability for multiple schools to unite their individual school identities to one new shared school identity can be politically challenging. Examples of this include the Bendigo and Croydon Maroondah Regeneration Projects (fig 30-32), where different project briefs were given by each school, with the architect required to sift through conflicting information, prioritise and streamline the brief and establish how it can inform the architecture. In these instances, having an active principal, who communicates well with and unites the teaching staff behind the project, is important.
Through reflection on the school community pole in the comparative analysis diagrams, I looked for consistencies across the projects and identified factors that seemed to impact the outcome. The question of who provides leadership within the stakeholder group is one issue. In the Bendigo Regeneration Project, the ‘top down’ leadership from the DET and a lack of unity between the DET, school principals and teachers seemed to lead to resistance of the proposed education model from the principals and teachers during design and post-occupancy use. In comparison, when the school took on the leadership in projects, such as Mt Ridley P-12 College, Keysborough Springvale Regeneration Project and exemplar Dandenong High School, it assisted in uniting the principals and teachers, encouraging them to participate in the design and contributing to the sense of ownership and belonging to the new school. Within this, the development of a strong school identity is also important, as seen in exemplars Preshil, St Francis de Sales and Melbourne Grammar School.

Reflection on the role of the different stakeholders within the school community allows me to understand how collaboration amongst stakeholders can contribute to the development of effective school design in a positive manner and improve the project outcome. I also became aware that the relationship between the school community and architect is two-way. The school community relies on the architect to design its school, but the architect also relies on the school community to contribute to the development of a clear design brief, in order to meet the needs of the school community.
Pedagogy

Like the school community, the development of the pedagogy pole has a complex range of issues. The values of the school community and development of a school identity can be expressed through its pedagogy, emphasising its importance. Similar to relationships within the school community, the drivers behind the development of the pedagogy also influence the outcome of the architecture. The pedagogy is also key to the development of the design brief for the architects and the success of the outcome.

The mid-2000s saw a shift in the approach to school design in Victoria, which I experienced in the first school projects I worked on with HASSELL. The DET was interested in exploring new approaches to school architecture, shifting away from the use of the traditional general purpose classroom as the building block for school design. A driver for this shift was the growing body of research on the relationship between architecture and pedagogy in school design. This included an awareness of the limitations of learning types that can take place in the traditional classroom, with a call for more sophisticated spatial arrangements to facilitate a broader range of educational activities (DEECD 2009b).

When I worked on the Bendigo schools, this school type was new in Australia and there was a lack of built precedent to draw up. The DET conducted research on international examples and the Victorian government engaged US-based education consultants, Fielding Nair International (FNI), to work with the DET and schools in planning the pedagogical direction and how this related to the architecture. FNI have worked as consultants and architects in many countries, advising on school design and have been influential advocating for modern pedagogies (Nair, Fielding and Lackney 2009, Design Share 2015).

Within the school community, the DET led the process for the four schools, with the needs and desires of the individual schools sometimes overridden in the pursuit of a larger project vision. Other challenges for the pedagogy included adapting FNI’s US education ideas to an Australian condition. Cultural differences, area allowances and budget limitations emerged and FNI’s ideas were recast to work within this framework. For Bendigo, the ‘top down’ approach allowed the implementation of radical pedagogical changes that would potentially not have been possible if the pedagogy had been driven by the school. However, I observed that this approach, combined with the unfamiliar school type, seemed to contribute to apprehension and animosity from the end users, resulting in resistance to the intended spatial and pedagogical use post-occupancy. This is discussed further in the Bendigo post-occupancy studies in the Pedagogy chapter.

The existing Bendigo schools were operating in traditional general purpose classrooms. The pedagogy proposed by FNI adopted open plan and multipurpose learning spaces. Some resistance to the design by the teaching staff was attributed to the fundamental changes proposed to teaching practice in the use of the new spaces. The Bendigo Education Plan, which was written prior to the beginning of the project, stated: ‘Teaching is a habit-bound profession. The demands of teaching necessitate
that teachers develop virtually automatic classroom routines to be able to survive the early stages of becoming a teacher. Once those habits and routines are set, it is profoundly difficult for teachers to modify them significantly (BEP 2005, p. 22). For the Bendigo teachers, the proposed change in teaching practice was seen as highly challenging, with some teachers opting to retire early rather than adapt to the proposed changes to teaching practice. This highlights the need for adequate support and training to assist teachers transitioning from traditional to new pedagogical practices.

For HASSELL, and myself as an architect, the untested nature of the new pedagogical ideas led to a long, two-year architectural design process. Each project stage was extensively laboured over and repeatedly re-drawn to test new spatial relationships for the stakeholders (fig 33-36). There were challenges for the architect in developing the brief, with resistance from staff to the new pedagogy and apprehension in participating in briefing consultations with the architect. There was also nervousness from the stakeholders to commit to a design direction, which impacted our ability to deliver a well-resolved piece of architecture.

The Bendigo Regeneration Project was the first school I worked on and the experience was a steep learning curve in developing an understanding of how to design to the DET building standards and budget limitations and within the highly structured procurement process. It was also challenging to understand the education discipline language and new DET pedagogical directions when our own experiences of schools was in traditional, general...
Eight years ago, Martin Culkin took three failing schools and merged them - with outstanding results.

IN DANDENONG High’s battered old school hall - in line to be redeveloped and not a moment too soon - principal Martin Culkin gathers his staff for a meeting. A neat man with silver hair, matching beard and an air of steeliness about him, Culkin talks about the usual things: tomorrow’s swimming sports; principals from Norway visiting next week; the importance of teachers being punctual; kids smoking behind the trees down the back.

Then Culkin tells them, with some difficulty, that he will retire on the last day of first term. He will be missed. When he has finished speaking, all the teachers stand and applaud him, and deputy principal Sue Ogden lifts her glasses to wipe tears from her eyes.

That Culkin, 62, is ready for a break is hardly surprising: in the past eight years, he has overseen the at-times fraught merger of three failing schools into a single, largely harmonious one, and survived a health crisis that almost took his life.

With more than 2000 students and 182 teachers, the story of the new Dandenong High is still being written. But the early signs are that this huge school in Melbourne’s outer south-east, which has built schools within schools and turned traditional ideas of classroom teaching on their heads, is starting to fulfil Culkin’s idea of a “transformative” change and, in doing so, give its students a brighter future than they otherwise might have had.

Dandenong High still has plenty to contend with: more than 80 per cent of its 2000 students speak a language other than English at home. At lunchtime, they chatter loudly in English, but also Dari, Sinhalese, Albanian and Tamil, to name a few. A third of the students are refugees, mostly from Afghanistan, Sri Lanka, Cambodia and, increasingly, Africa. Many have had interrupted schooling or no schooling at all; some arrive not only unable to speak a word of English, but completely illiterate.

Dandenong is culturally rich but one of the most disadvantaged areas in Melbourne. Almost 90 per cent of families at the school receive the Education Maintenance Allowance, which means at least one parent is a healthcare card holder. Some cannot afford the uniform or textbooks, and the school helps with all these things.

With a $45 million redevelopment to oversee, Culkin’s job was to create a new school that would offset those complex layers of disadvantage, while merging three schools - one of which was initially reluctant to come on board - into one unified, high-functioning school. To say that it was a big project is an understatement.

“We were confronting issues of uniform, student behaviour, work expectations, basic courtesy to teachers, dynamics with the parents community, the whole box and dice,” Culkin says.

Over the weeks that The Sunday Age spent at the school, sitting in on classes and speaking with students and teachers, the consensus seems to be that it has been a great success.

Of course, the school is not perfect. Its VCE and NAPLAN results are not yet where teachers want them to be, although they are showing improvement: last year, the school lifted its percentage of VCE study scores over 40 to 3.9 per cent from 1.9 per cent the year before, and 47 per cent of the school’s year 12s went on to university, which is higher than the state average and up from 37 per cent in 2007. There are also ongoing issues around punctuality and attendance: while absenteeism at years 7, 8 and 12 is slightly better than the state average, at years 9, 10 and 11 it is slightly worse.

But if the feel of a place is anything to go by, then Culkin and his team have managed to create a school where the students actually want to be, and in which they want to learn. He has done this with a mixture of innovation and discipline, applied equally to students and teachers.

Culkin became principal of the old Dandenong High School in 2000, having been principal at Parkwood Secondary College in Ringwood and, prior to that, one of the last technical school principals at Echuca Tech in Victoria’s north. By 2003, there was a feeling that the schools in the Dandenong area were not performing well enough and something needed to be done.

Backing on to Dandenong High was Cleeland Secondary College, with about 550 students and a large refugee population, including kids from Sudan who had never stepped foot in a school until arriving in Melbourne. Culkin says constant restructuring and experimenting led to some improvement in attendance and results, but it was still not performing as well as it should.

Not far away was the tiny Doveton High School, struggling to get by with just 175 students.

Although academically the strongest and the biggest of the three schools with 1350 students, Dandenong High was also “just travelling along”. Students were increasingly disengaged and results were not what the teachers wanted them to be. Culkin realised that the school’s set-up, its traditional model of one teacher in front of a class of 25 or so, just wasn’t working.

By the end of 2004, talk of a merger began to percolate from the schools themselves.

The Education Department, under the Bracks government, backed the idea of the three becoming one, although Culkin admits he worked the political system hard to get what he wanted. He lobbied then education minister Lynne Kosky and - more successfully - her successor Bronwyn Pike for the $45 million the redevelopment would need, which was helped by being part of a “regeneration” project for the Dandenong area.

It was always going to be hard: Doveton accepted its situation was unsustainable,
purpose classrooms. This process was similarly testing for the DET in gaining confidence in the new education directions through testing design options. The tentativeness to commit to a design led to many design iterations, putting pressure on the project delivery timeframes and impacted on the resolution of the architecture with some awkward design outcomes noticeable post-occupancy.

In later projects, such as Keysborough Springvale Regeneration Project and Mt Ridley P-12 College, by Y2 Architecture, the school played a stronger role in the development of the pedagogy and architecture. The DET’s new pedagogical directions were more widely understood by teachers at this stage and the school was already on board with the proposed teaching practices. This contributed to a smoother design process and allowed more time for the architecture to be resolved to a higher level of detail, with Mt Ridley P-12 College a finalist for two awards with the Victorian School Design Awards – in 2009 for Best Primary School and in 2010 for Best School Project.

Schools taking the lead in the development of the pedagogy and architecture can also be seen in the exemplar precedents that I selected for my study. The principal, Martin Culkin, at Dandenong High School, played an instrumental role in pursuing the development of the project, revealed through an interview with him (fig 37) and published documentation (Newton & Fisher 2009, Dunn 2012). The school conducted education research of international school type examples, with the aspiration of developing something specific to respond to the needs of its particular school community. Similar to the Bendigo project, Dandenong was developed to address social and education issues in the Dandenong local area. The difference in the development of the pedagogy was that, at Bendigo, the pedagogical direction was largely driven by the DET and FNI, whereas at Dandenong, there was a collaborative approach between the school, Australian education consultant, Julia Atkin, design consultant, Mary Featherston, and Hayball architects.
Another key difference was that during design development, the project team spent time observing the interactions between teachers and students within the existing schools. From this knowledge they were able to develop a deeper understanding of the potential types of teacher–student interactions and design learning spaces to facilitate this. They tested ideas through setting up a prototype space in a portable classroom (fig 38). This allowed the architects and teachers the opportunity to trial and test the new pedagogical practices being proposed, and its relationship to architecture, before commitments were made to the final design.

At Dandenong, similar to Bendigo, reaching a consensus on the internal spatial arrangements also took a large amount of time for design. Hayball developed strategies to accommodate this, with non-load bearing internal walls, which allowed time for the internal planning to be resolved while still meeting the project timelines (Newton & Fisher 2009). This contributed to a higher degree of architectural resolution, which was later recognised through several design awards. Dandenong High School has become an exemplar school for both its architectural and educational achievements in improving educational outcomes for its students, as well as the collaborative approach to design.

This project has become very influential, visited and studied by many architects and educators since its completion. It has been particularly influential to my own work, as it was produced under comparable circumstances to the Bendigo Regeneration Project and experienced similar issues during the design process, but the key collaborators (architect, principals and education consultants) developed strategies and approaches to effectively work through issues as they arose, which are discussed in the Dandenong High School case study in the Pedagogy chapter.

The comparative analysis diagrams highlight some common influential factors on the pedagogy pole in my own work and the exemplar precedents. There is a need for a commitment from the school community to a pedagogy, as seen in the Bendigo Regeneration Project; and creative design solutions to meet the DET project timeframes if design is unresolved, such as Hayballs’ development of non-load-bearing internal walls. The school needs to be aware of the timeframe constraints for the architect and work collaboratively to make decisions and allow time for architectural resolution. Both the school community and architect need to develop an understanding of the desired types of interactions between the teachers and students and how this can be facilitated by the architecture.
In the DET school design process, the architect is the principal consultant and leads the design and consultant team in the development of the architecture. Part of this role involves developing an understanding of the needs of the school community and the school’s pedagogy. The school prepares an education rationale, which focuses on the vision and intended new direction for the pedagogy. The architect’s role is to develop this through briefing sessions with the school and evolve these ideas into architecture, which has its own set of challenges.

In consideration of the architecture pole within the three key relationships diagram, I’m interested in understanding the school community and pedagogy poles and how they can be brought together through architecture.

At the time of the Bendigo and Dandenong Regeneration Projects, the DET was in the process of developing new school design guidelines for architects. This meant that on the Bendigo Regeneration project, we needed to develop our own brief, in consultation with the DET, FNI and schools.

During this process, many consultation workshops were held with the school. A number of tools were used in an attempt to extract useful design information from the teachers and to understand the relationship between pedagogy and architecture.

In the early stages of design, workshops were held with teachers focused on their desired vision for the future of their school and the types of spaces they envisioned. This was challenging, as the teachers struggled to imagine learning spaces beyond what they had experienced and found it difficult to brief us on what they might need when they hadn’t experienced the new pedagogical practices that were so different to the way they were teaching. This contributed to the emphasis on leadership from the DET to provide a clear direction for the schools.

As the design progressed, the briefing emphasis changed from requesting design direction to seeking detailed information on the functional requirements of the teaching spaces. The ‘functional briefing document’ was developed as a tool to collate and manage the pragmatic briefing information. This document merged and rationalised the briefing information from the three individual school communities coming together in the new school. The document records on a room by room basis, items such as joinery, fixtures, fittings, light, services, ventilation, loose furniture, teaching aids etc., so that each room could be fitted out.

This type of document was also used at Y2 Architecture. It’s useful for architects in managing the abundance of briefing information collected, assisting in briefing consultants and services engineers on the school’s functional requirements, as well as ensuring consistency across large school projects. However, as a briefing tool, the document mostly consists of pragmatic information, without a sense of design context, hierarchy of priorities or how the information relates to the vision and objectives of the school community and pedagogy.
When later school projects were completed, such as Keysborough, Mt Ridley, Croydon and Ballarat, the DET school guideline document, *Pedagogy and Space*, was available (fig 01). This document acknowledges the body of research on the connection between pedagogy and space (State of Victoria DEECD 2009a) and supports explorations of this relationship in new school architecture. However, the document focuses on pedagogical ideas, and the connections between learning needs, teaching practices and space are only discussed at a conceptual level. There is a lack of design guidance for the architect on how to link pedagogy and architecture or shape the school design to meet the needs of a school community. As an architect, I'm interested in understanding the relationship between the curriculum, pedagogy and architecture and ways of facilitating this connection in my practice.

In the projects I completed with HASSELL and some early projects with Y2 Architects, similar approaches were used to develop a brief with the school, using consultation workshops and collating information into functional briefing documents. A lot of time was spent conducting workshops and later recording the information gathered, and we often found that only some of the information was useful or informative to the design. There were also gaps between the requested information and the types of answers received, if at all, with design solutions from completed past school projects sometimes used to fill the gaps in the absent briefing information.
In later projects with Y2 Architecture, such as St Josephs College (fig 39-45), we tried to bring the school into the design process in a more engaging way. We held workshops with the school community of principals, teachers and students, and asked them to develop a masterplan for the school in groups using pre-prepared cutouts representing spaces within their school on an A0 masterplan. The school community embraced the process and the opportunity to actively experience the design process. They presented their schemes to the other groups and a final version was agreed upon for development by the architects.

Looking at the challenges of the briefing process, I became interested in finding new ways of engaging with the school community to develop a greater understanding of the pedagogy through the development of a design brief, which could assist in transforming the information into the architecture.
Reflection

Many of the briefing interactions between the architect and school on the projects with HASSELL and Y2 Architecture focused on collecting programmatic and the practical information needed for the resolution of the architecture. This emphasis was partly driven by the school who was focused on ensuring the spaces support the functional teaching practices, with the aesthetics seen as a secondary concern. This highlights a potential role for the architect, to engage the school further in the potential of the design and balance the focus of the design process to ensure the development and resolution of the architecture beyond purely practical considerations. Part of this role may include educating the client on the contribution architecture can make in expressing a school’s identity, values and different ways of facilitating pedagogy. An example of this was used at Dandenong High School, where Mary Featherston created a prototype space during the design stage. This allowed the architects and school to trial different spatial arrangements and the types of spaces needed to effectively facilitate them. This type of initiative brings the school along in the design process and allows the testing of the proposed design intent, with unsuccessful spaces eliminated during the design stage.

My reflection diagrams initially mapped the collaborators in the school design process, revealing the complexities and variations across projects. I simplified these into a diagram communicating desirable attributes of the collaborators (fig 46).

However, when I reflected on the diagrams, looking for consistencies across projects, I identified that the collaborators represented three key areas of architecture, school community and pedagogy. The design process requires a balance between the three parties and each parties ability to perform its role, with some clear challenges (fig 47-48).
fig 47: Dandenong High School comparative analysis diagram.

fig 48: Identifying three key relationships in developing the brief.
This led to my application of the term pole to describe the school community, architecture and pedagogy, as each of these parties has the capacity to take the project in a different direction.

For the school community pole, I identified the importance of the stakeholders, including government, teachers, students and families, to work together collaboratively. The commitment to a shared project vision between stakeholders and a well-defined school identity contributes to a smoother design phase for the architect, while support for the project from staff potentially contributes to a smoother transition into the new learning spaces.

For the pedagogy pole, I recognised the importance of a commitment to a pedagogy, ensuring its relationship with the architecture could be fully resolved in the design. The benefits of observation of interactions between teachers and students within the space led to a deeper understanding of school design and the nature of the relationship between architecture, curriculum and pedagogy.

For the architecture pole, I gained a more thorough understanding of how the relationships within the school community and understanding of the pedagogy impact the role of the architect and the development of the architecture. The architect needs to be able to interpret the school community values and evolve the pedagogy into architecture.

The identification of the poles and the relationship between them represented a shift in my thinking about the school design process, from a procurement perspective to a more focused understanding of the key relationships and the issues in facilitating them. This led to an interest in further research on the relationship between the architect, school community and pedagogy, raising new questions and shaping the direction of the PhD research (fig 49-50).

This inspired a series of project case studies to understand the challenges and complexities of the poles, which are explored through the Architecture, Pedagogy and School Community chapters. The research informs the proposed suite of school design tools, developed in response to the issues identified, and to facilitate the building of the three key relationships between the school community, pedagogy and architecture poles in designing schools in my practice.
fig 49: Initial sketch of three key relationships diagram.

fig 50: Three key relationships diagram, June 2014.
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3.1 Architecture

The Architecture chapter reflects on school projects I completed with HASSELL and Y2 Architecture, prior to commencing the PhD. This reflection focuses on the role of the *architecture pole* within these projects and its relationship with the *pedagogy* and *school community* poles. The projects are contextualised into a broader discussion of what architecture has contributed to the history of school design to create aspirations for the *architecture pole* in school design. This reflection informed the development of the *school design tools* and how such tools can assist the architect during the design stage.
fig 01: Three key relationship diagram, June 2014.

fig 02: Translation of traditional general purpose classroom into two different types of spaces. Some pedagogical settings from GPC are visible in the new spaces.
**Introduction**

How to design schools and prepare students for an unknown future is a subject of research and much debate among architects and educators, with a range of views. Changes in pedagogy have challenged the approach to school design (Cleveland & Woodman 2009), with school architecture shifting away from the traditional classroom model as modern teaching practices require more complex spatial arrangements (fig 02).

Access to new technologies in schools and the nature of how knowledge is obtained by students is changing the traditional role of the teacher, from being the keeper and master of knowledge to the role of facilitator and mentor in the learning process. Emphasis is on creating an education experience that responds to the needs of individual learners (DEECD 2009b). Students require different skills to their parents to be prepared for future workplaces, some not yet imagined. This changing climate has created opportunities for the architect to question and challenge conventional ideas of school architecture.

Through comparative analysis diagrams I identified the importance of the relationship between the school community, pedagogy and architecture poles. In this chapter I reflect on my past practice projects, recognising that effective school architecture strikes a balance between the three poles (fig 01).

The projects are contextualised into a broader discussion of what architecture has contributed to the history of school design to assist in developing an understanding of the architecture pole and its relationship with the pedagogy and school community poles.
Architecture and school community poles

Community

Architecture can facilitate the relationship between a school and its community, which is a design aspiration that has informed many of the school projects I’ve worked on. This relationship between architecture and the creation of communities is discussed by University of Melbourne associate professor, Hannah Lewi, and urban planning lecturer, David Nichols, in their book *Community*: ‘buildings which house public community services define and perpetuate a sense of belonging and social connection’ (Lewi & Nichols 2010, p. 9).

Recognition of the role of schools in the building of communities can be seen during other periods in Australia, such as the 1950s. This is discussed by architectural researchers at the University of Melbourne, Sinan Healy and Kate Darian-Smith, as part of their Australian Research Council paper, ‘Educational spaces and the ‘whole’ child: A spatial history of school design, pedagogy and the modern Australian nation’.

Healy and Darian-Smith discuss the Australian government’s recognition of the important role schools play in addressing social issues, creating modern citizens and rebuilding communities. ‘In the aftermath of World War II, post-war reconstruction focused on the provision of the essential infrastructure to foster community and civic values, including a major building program of schools and their facilities’ (Healy & Darian-Smith 2015, p. 1). Architecture plays an important role in the building of communities, designing schools along with other key public buildings.

Historically, the relationship between a school and its community has gone through several shifts in response to changing ideas of the role of the school within society. These are discussed by Catherine Burke and Ian Grosvenor, education academics and researchers in the UK, in their book *School*, which describes schools in the pre-industrial era as having a strong connection with the local community. During this time, learning was informal and personal, taking place in public spaces, such as the village church, market or theatre.

This changed in the 19th century industrial era, with the introduction of compulsory education and the formalisation of the education process. Architecture facilitated the streamlining of the education process through the design of a new modern school ‘characterised by the architectural organisation of social space into classrooms, a school hall and playgrounds’ (Burke & Grosvenor 2008, p. 65). During this time, learning became impersonal, with students separated from the community in confined classroom spaces.

These stages are also summarised by Julia Atkin and Martin Culkin (2011), who describe the 21st century knowledge era as characterised by a shift back to the reintegration of schools into the community, creating a more personalised learning experience through formal and informal environments.
With the significant financial investment required for new school buildings, interest in how the broader community can also benefit is occurring internationally (NACCCE 1999) and is promoted in Australian government school policies (DET 2005).

These relationships range from the hiring out of facilities after school hours to shared public and school use facilities, as well as the integration of community, health and support services on the school site. For the school, creating new types of learning opportunities through real-world interaction, can improve student engagement and outcomes. This can broaden the school's social networks within the community and operational costs can be shared through hiring and shared-use facilities.

The community benefits through increased access to facilities they couldn’t otherwise use and the use of the buildings out of school hours reduces vandalism and improves school security. This interaction between the school and community builds a positive image of the school within society and encourages the community to participate in school activities. With recognition of the broad range of benefits to both the school and the community, the development of a strong relationship between the school and its community context is an aspiration present in many of my past school practice projects (fig 03-06).

fig 03: Crusoe Secondary College, 2010, HASSELL. Shared school and community-use gym,

fig 04: Crusoe Secondary College, 2010, HASSELL. Shared school and community-use gym,

fig 05: Bendigo South East College, 2011, HASSELL. Integration of existing school and community-use sports stadium to school masterplan,

fig 06: Bendigo South East College, 2011, HASSELL. Integration of existing community wetlands to school masterplan,
The architecture can facilitate building the school’s connection with community through the inclusion of other key public buildings within the school site. Schools have been used in low-SES areas as part of long-term strategies to build stronger community engagement, breaking the cycle of intergenerational social disengagement. In these areas, the severity of the social problems can inhibit students from learning effectively and families are given easy access to support services through the school to resolve health and social issues, allowing children to focus on their learning. The Ballarat South Community Health and Learning Precinct with Y2 Architecture is an example of this strategy, with community and shared-use facilities (fig 07-10).

The P-12 school includes facilities for lifelong learning needs of the whole community and provides social infrastructure for the region. The project was developed in collaboration with local councils and government health and education departments to provide services that respond to the needs of that particular community.

The primary school site for Prep–Year 4 hosts an early years childcare centre, occasional care centre and maternal and child health. The senior site for Years 5-12 includes a child family services parenting centre to enable young parents to balance finishing school with the responsibilities of parenthood. The community library is shared between the school and community, and the trade training centre generates links with industry and real-world experience. The gym and existing community hub provide shared-use sports and recreation facilities, with community partnerships to be generated to fund the proposed
400-metre athletics track. The school created links with charities, community and youth action groups to provide additional support to disadvantaged students. The integration of community and school buildings informed the site planning, with community facilities arranged for street access, and the core school buildings located on the interior of the site.

The creation of Ballarat South Community Health and Learning Precinct involved planning and coordination across multiple government departments, with few examples of this approach taken in Victoria. A contributor to this is the challenge in coordinating multiple government departments and local councils, with different timing in funding cycles, policy limitations and complexities in sharing land and assets between government departments. Coordination of these projects requires substantial planning, which does take place for some schools, while others are developed quickly as government funding becomes available, limiting the amount of planning time that can take place prior to commencement of design and coordination for shared facilities.

However in academic measures, there is a lack of understanding and formal research into the benefits and efficiencies of these types of facilities and the government policies and practices that surround them. Dr Ian McShane, senior research fellow at RMIT University’s Centre for Urban Research, has recently completed an Australian Research Council research project, ‘Opportunity spaces – Community engagement in the planning, use and governance of shared school facilities’. In a working paper, McShane et al. (2013) discuss that there are few critics of these types of developments and that they are welcomed by the local communities, however, there is little post-occupancy analysis of the outcomes for schools and communities. He identified significant policy gaps for shared-use facilities and the need to review their provision to accommodate the education direction of the 21st century and the potential for lifelong learning.

For the Victorian government, the planning of schools as part of the development of new communities is increasingly important, with new policies such as ‘Precinct Structure Plans’ (2013) developed by the Growth Areas Authority. These policies are being used to more effectively plan the creation of communities within the growth areas of Melbourne. ‘PSPs are masterplans for whole communities of up to 30,000 people and are designed to create new communities, rather than just housing estates. They plan roads, shopping centres, schools, parks, housing, employment and the connections to transport in the creation of new suburbs to support the 1300 new residents moving to Melbourne each week’ (GAA 2013 p. i). These types of policies form part of a strategy to design more effective communities in Victoria, with the architecture of schools an integral part of communities.
Community learning

The school as a site for the lifelong learning needs of the community is an aspiration promoted by education consultants Fielding Nair International (FNI) in Crusoe Secondary College and Bendigo South East College with HASSELL. These projects are based on FNI’s Community Learning Centre model (Nair, Fielding & Lackney 2009), which promotes links between the school and community through community use of school-owned facilities and shared-use facilities that are funded with an external organisation. This informed the development of both projects. In the Crusoe Secondary College masterplan, the site is divided into a community zone and school use zone. The community zone includes shared use of the performing arts centre and community access to the school’s gym, oval and sports facilities. The zones are separated by the main school entry promenade, with the school zone containing the facilities for core learning activities (fig 11).

In Community, Lewi and Nichols state that: ‘The use, style, position, size, adaptability, access, ownership and mode of creation are all crucial in definitions of a building’s value. Buildings tell their users about themselves and wider society’ (Lewi & Nichols 2010, p. 9). This can been seen at Crusoe Secondary College, where the masterplan sets up clear strategies for the school’s relationship with its community.

The Victorian government schools that I’ve worked on were designed to meet the needs of each school community. Through the design process, architecture can create a unique identity for a school, shaped by its local context. Crusoe Secondary College, with HASSELL, is an example of how the architecture location, form, materiality and colour works together to create a school that sits comfortably in its surrounding landscape.

The four buildings are large, designed for up to 275 students each. The scale of the large buildings are broken down through the design of the form that divides the facade into a series of smaller components, creating a less institutional and more human scale for the students. In Victorian government schools, the materials must be economical, robust and resistant to vandalism. The material palette for Crusoe Secondary College includes metal deck roofing and wall cladding, glazed bricks, precast concrete and cement sheet. The building material colours and hard surfaces in the landscaping are designed to blend in with the native vegetation through grey, rust, cream and green tones (fig 12-15).
The shaping of the landscape design in plan responds to the site context through using the abstracted form of the kangaroo in reference to the school location of Kangaroo Flat. As this is a drought-affected area, ESD initiatives have been used to maximise water collection, such as rainwater tanks, landscape swales, rainwater gardens and native drought-resilient planting. As the native landscape has grown around the buildings, the harmonious relationship between the buildings and the site has become more apparent.

During design stage, there were aspirations at Crusoe Secondary College for a permeable school site with no fences, to encourage the interaction between the school and community and work in with FNI’s design aspiration of creating a school for the lifelong learning needs of the community. However, with concerns for managing student safety, a perimeter fence was later installed (fig 15). Balancing the safety of students and the prevention of vandalism, while encouraging interaction between
school and community, can be challenging. The installation of perimeter fences as a means of controlling student safety creates a physical barrier and sends a clear visual message, inhibiting the school’s relationship with the community, and potentially limiting access to shared-use facilities after school hours when gates are locked.

In an interview with Prakash Nair from FNI, he discusses this issue. ‘We probably create much safer schools when the community actively engage and take ownership of the building ... even in the toughest neighbourhoods, schools that have been adopted ... by the community are far safer places, have far less evidence of vandalism and damage than schools that are treated very traditionally, where the students are treated like prisoners and the teachers like wardens’ (Nair 2006). He suggests that the basis for creating a safer school is about building a strong community. These types of issues need to be thought through and agreed upon during design stage, so that seemingly simple decisions, such as the installation of a fence, don’t compromise the overall objectives of the project.

School community

The idea of creating a sense of community on the campus is frequently used in the design of schools, with the idea playing out at a range of scales. At the campus scale, this can be seen through arranging buildings on site around large outdoor spaces or community greens. These spaces are large open areas and work like a city square, creating a focal point for the school community in the centre of the site and acting as a hub for the community, accommodating different types of social, learning and recreation activities.

Urban planning principles for schools are discussed by Luxembourg architect, urban planner and architectural theorist Leon Krier. In his 1978 St Quentin-En-Yvelines school near Verailles he uses a number of techniques to create a school that is more akin to a village. The school is planned with many small buildings arranged in a network of streets and public squares, allowing the school to be built in stages without looking incomplete. The buildings are planned and arranged according to whether they’re a shared school and community building, such as a library, or school-use building, such as teaching spaces or administration. A hierarchy is then created to give visual prominence to the shared school and community buildings through increased height, the materiality and robustness of public architecture and greater facade detail. In contrast the school-use buildings are smaller in scale, simpler in wall construction and finished with a simple white render. The public squares are situated centrally, surrounded by buildings, creating a strong sense of place.
The planning of a school masterplan as a village can be seen in Mt Ridley P-12 College and Ballarat South Community Health and Learning Precinct (fig 16-17). Both of these projects include many buildings that were planned to be built across the site in different funding stages. The buildings are arranged in a non-linear and unstructured manner around paths and open spaces. This type of planning allows the school to add new buildings and open spaces in the future, without it being an obvious deviation from an overall masterplan. In these projects, the school buildings with shared community use are located towards the perimeter of the site, with core teaching buildings towards the centre.

The school as a village can also be seen in Melbourne Grammar School’s Grimwade House by Peter Elliott (fig 18-19). The buildings on this campus have been built over the last 100 years, with a range of architectural styles from the 1880s, the 1920s, 60s, 80s and Elliott’s ongoing work from the 2000s. In a practice profile published in Monument, Professor Martyn Hook compares the school’s evolution over time to that of the growth of a village. In this article, Elliott’s role is described as ‘housekeeping’, where he’s added to, removed and reprogrammed some of the existing buildings to unify the school campus.

Hook suggests that the addition of a new auditorium is akin to a village hall and the creation of a courtyard operates in a similar manner to that of a village square. This project shows how the robustness of the existing architecture has allowed it to adapt to changes in education use over its long lifespan.
The late 19th century Austrian architect and urban planner, Camillo Sitte, also discusses the creation of public squares in his classic city planning book, *City Planning According to Artistic Principles*. He describes ‘the main requirement for a plaza, as for a room, is the enclosed character of its space. Modern city planners are unaware of this most important and really essential prerequisite of any artistic effect’ (Sitte 1965, p. 170). Sitte discusses the artistic benefits of non-geometric or irregular-shaped plazas. ‘It is generally realised from personal experience that these irregularities do not have an unpleasant effect at all, but on the contrary, they enhance naturalness, they stimulate our interest, and, above all, they augment the picturesque quality of the tableau’ (Sitte 1965, p. 189). Sitte’s observations provide insight into desirable qualities in the creation of public spaces.

Some of the urban planning ideas used by Krier and Sitte have informed my reflection on my school projects, such as Croydon Maroondah Regeneration Project with Y2 Architecture (fig 22). The architecture facilitates a sense of community within the school. The site planning is divided into six smaller buildings or learning communities. Through this, the architecture assists in the social organisation of the students within a large campus. Each learning community is designed to house up to 150 students, which research shows is the maximum number of people a person can have a genuine relationship with (Bennett 2013). The buildings are arranged around a central community green space, acting like a public plaza for the school, with the double-storey wall of the circulation spine providing partial enclosure to shape the space.

The idea of placing buildings around a central community green is also used at Crusoe Secondary College, where it acts as the social hub for the school (fig 20-21). The pedagogy organises students by year level into four community centres across the site, with two small learning communities within these buildings of 125 students. To create a sense of identity for the students within a community centre, each is connected to or adjacent to a specialist facility. These include Admin, Food Technology and Library; Design and Technology; Performance; and Health, Fitness and Wellbeing. The same colours and material palette are applied externally to the architecture for visual continuity across the campus, with each building given a separate identity through the use of different colours to the interior of each community centre.

A similar approach is used at Mt Ridley P-12 College, where a consistent architectural style and material palette is used to unify the buildings across the campus. However different feature colours are used externally on each building, giving each building its own visual identity (fig 23).
The outdoor shared community space has emerged as key to the overall school design. At Crusoe Secondary College, the community green is designed with large areas of hard surface, rather than grassed areas. This was influenced by the dry climate and a desire to minimise ongoing maintenance and watering for the school. However, in post-occupancy visits, the school advised that the large areas of hard surface reflected the heat in the hot Bendigo climate, making the space difficult to use in hot weather.

At Croydon Maroondah Regeneration Project, a different approach was taken, with large areas of grass and soft landscaping proposed for the community green, which would have assisted with this issue. Both schools would benefit from the provision of outdoor shading to assist in the usability of outdoor social spaces throughout the year, which wasn’t funded in the DET budgets. In my reflection I also recognised the large amount of time spent on designing the buildings themselves, with little time spent considering the design of the outdoor learning environments and community green spaces to foster social and informal learning opportunities.
Architecture and school community poles

Reflection

Reflection on my past practice projects through looking at how the school community informed the architecture gave me a greater understanding of the complex range of ideas on school community that informed the design. Now I understand that creating a school with an effective relationship within the school and broader community is dependent on a broader range of influences than just the development of the architecture.

While aspirations for a strong relationship between a school and its community are shared by schools, education theorists and government, it needs to be supported at the government level through policy, planning and funding, and at the school level, through a commitment to the practice of these values and easy methods for their management.

These projects show strategies for creating a sense of community within a school, but also that these ideas are strongly entwined with pedagogy and architecture. There is a complex range of ideas that need to be prioritised within the project so they can be clearly communicated through the architecture.

My research on school community and school identity has allowed me to see other ways of creating a sense of identity for the school beyond the strategies used in my past practice projects. The whole school site can potentially operate as a learning environment, an idea that was explored in the development of the Sandringham Project.

fig 24: Sandringham College, traditional general purpose classroom.

fig 25: Sandringham College, corridor adjacent to traditional general purpose classroom.
Architecture and pedagogy poles
Sloars have existed in various forms for hundreds of years and the large single room as a way of educating whole populations in the one space through the use of mixed-age groupings was common in some of the early types of schools (Burke & Grosvenor 2008). This changed over time with the introduction of free compulsory education, which occurred in 1873 in Victoria, and the need for more larger schools. In the 20th century, the corridor, with classrooms either side, was the dominant approach to school design (Nair, Fielding & Lackney 2009). From a design perspective, the general purpose classroom has a strong relationship between the pedagogy and architecture. It is an effective way of delivering teacher-led instruction to students for rote learning. The classroom contains the spread of acoustic noise to one area, manages light through placement of windows and controls student movement through one door for easy teacher surveillance (fig 24-25).

New approaches to school design are seen by many educators as necessary to provide effective spaces for new educational philosophies and approaches to pedagogy for the 21st century (Dudek 2000). These new types of learning spaces need to be able to accommodate up to 20 types of learning modalities, with the traditional classroom only covering some of them (Nair, Fielding & Lackney 2009). Designing schools that respond to the needs of individual learners is challenging and, in Victoria, the open plan school of the 1960s and 70s failed as a model for education. In a similar way to today, the open plan school movement of this time developed in response to social and education reforms that drove changes to pedagogy and the architecture that enabled it (Cleveland & Woodman 2009). There were various reasons attributed to its lack of success. A study of open plan schools by Gump (1980) in the late 1970s found a lack of alignment between the pedagogy and architecture, with open programs not being taught in open plans. It was assumed that the pedagogy would adjust to align with the architecture, but instead, over time, walls went up so that teachers could practice more traditional teaching approaches. Similar issues were found in a study of open plan schools from the 1970s, where ‘changes in teaching methodologies had not kept pace with innovation in school design and the rhetoric of child-centeredness was not matched by the reality of the experience’ (Brogden 2007, p. 55). Part of this failure Brogden attributed to the conservatism of teachers and the tendency towards rejection of centrally imposed ideas. In the 1980s, there was a return to the traditional classroom as the fall-back position for the education environment.

In the mid-2000s there was a renewed interest in how to design schools that shift away from the traditional classroom as the building block for school architecture, with an awareness of the issues that contributed to its downfall in the 1960s and 70s. The pedagogy that now informs the development of Victoria’s government schools includes a broader collection of ideas.
Pedagogy pole
Flexibility
There are different views held by architects and educators on how to accommodate flexibility in school design and how much flexibility should be provided. This can range from open plan spaces, where the user can participate in the changing spatial arrangements to suit pedagogical activities, to providing a variety of spatial settings that the users move around to suit their activity, or spaces more closely tied to a particular curriculum.

Designing spaces that are ‘flexible’ is also tied into the desire to develop ‘student-centred learning’ spaces, creating a more personalised education experience for each student. Flexible spaces allow greater differentiation in the curriculum through providing a greater variety of spaces for different types of teaching and learning practices to occur within the same area.

At Crusoe Secondary College and Bendigo South East College, FNI informed the open plan pedagogy, advocating the benefits of under-designing a school ‘...it’s a mistake to over-design a school and architects have to remember that the best kind of school is one that is under-designed, which gives a huge amount of opportunity for the occupants to tailor and customise it on a day-to-day basis’ (Nair 2006, p. 4). The schools are designed independent of curriculum, allowing the buildings to adapt to accommodate pedagogical changes over its lifespan.
At Crusoe Secondary College, the learning community is given flexibility through extensive open plan space, with smaller spaces designed for specific activities. There are two open plan neighbourhood areas, housing up to 150 students, with shared meeting and group work areas. Each neighbourhood includes a kitchenette to accommodate wet area activities without moving to an art or science room. Staff are located near teaching spaces, providing passive supervision and strengthening student–teacher relationships. Entry is through the Einstein studio, which acts as a central non-programmed breakout space. The school uses loose furniture to adapt the open plan areas to accommodate different pedagogical activities.

The open plan allows flexibility in interior arrangements, where the users can change the setup for particular activities (fig 26-29). The space is designed to accommodate as many learning modalities (Nair, Fielding & Lackney 2009, p. 28) as possible, with all activities needing to be accommodated over the scale of the school.

The Keysborough Springvale Regeneration Project uses a more specific approach to the design, with a greater variety of spatial arrangements within a larger area, to allow different pedagogical activities to occur in close proximity to each other. In the Year 9 building, flexibility is accommodated through a mixture of open plan learning, together with classroom-size spaces designed to accommodate different activities, such as creative wet area spaces or clean area activities. The two staff areas have a strong visual connection to adjacent spaces and are positioned for passive supervision. Similar to Bendigo, there is an interest in the idea of accommodating multipurpose speciality spaces and, in this case, art, science and technology are combined. At a junior level, art and science are easy to combine, with technology incorporated at a basic level. Students and staff can move between different types of spaces within the same area, according to the pedagogical activity (fig 30-31). 
Mary Featherston argues that ‘An interior environment that is relatively permanent rather than totally flexible saves teachers’ time and energy, which would otherwise be spent in negotiating the changing use of space and then in physically “scene shifting”’ (Featherston 2010, para. 14). At the Keysborough Springvale Regeneration Project, the use of the space is suggested and flexibility is achieved through moving around the space for different activities, with a greater variety of spatial arrangements built into the architecture than at Crusoe Secondary College.

The school interior designs of Mary Featherston in projects such as Wooranna Park Primary School (fig 28-30) provide insight into the many considerations to take into account in achieving the right amount of flexibility in school design. Featherston argues that spaces need to be ‘purposeful’ (Featherston 2010, para. 8) and suggest the type of activity to occur within the space, providing guidance to teachers and students on the intended use of space.

A challenge for architects in designing schools is to find the right balance in how flexibility is provided. Open plan spaces can allow its users to have ownership over the space through adapting it to different uses. But too much flexibility can leave teachers uncertain on how spaces should be used or what to do with large groups of students in completely open plan areas.
Multipurpose space can occur through designing areas that combine a number of different activities or a mixture of subject areas that have traditionally been taught separately. For example combining subject areas such as art, science and technology into the one space. The education theories of FNI in this area have informed the development of these spaces in school projects that I’ve worked on. FNI advocate the interdisciplinary method of working used by Leonardo Da Vinci as an example of how these types of spaces can work, with ‘Da Vinci studios’ emerging in many Victorian schools over the last few years.

Designing multipurpose space has a range of benefits to a school, building on similar ideas to approaches to flexibility. Multipurpose space can lead to increased fluidity in how students learn, providing a greater variety of resources at hand without the students needing to change spaces. This also assists in providing ‘student-centred learning’, with students able to approach the same task in different ways or even using different mediums, allowing them to work in ways that meet their varying needs. This can give schools more flexibility in the way they teach and provide more scope for differentiation in the curriculum.

Multipurpose space increases the efficiency of the floorplan through intensifying the capacity to timetable multiple subjects in the one space that are traditionally housed in separate specialist spaces. This provides greater use of the space across the week and allows the school to allocate the saved space to other areas in the floorplan.

At Crusoe Secondary College, learning communities have a centrally located Da Vinci studio, connecting to neighbourhoods. The space combines art and science and is intended to work in collaboration with the adjacent Einstein studio, which provides a flexible unprogrammed breakout area for quieter activities, such as creative reflection (fig 31-32). In the Da Vinci studio, art facilities are housed on one side of the room, with perimeter art sinks and loose furniture providing flexibility in layout. Facilities for science are housed on the adjacent side, with perimeter benches for experiments, with science sinks, gas taps and a central demonstration bench. The space can be used for 50 students or separated through closing the operable wall, so that art and science classes can run concurrently.

One learning community houses a double Da Vinci studio for up to 100 students, with additional specialised equipment, such as fume cupboards for more specialised science projects. The Da Vinci studio links to external space that can be used for messy activities, providing students with another environment to work in.
The Keysborough Springvale Regeneration Project Year 9 building includes a START studio for the learning community. The school was interested in combining facilities for art, science and technology. Similar to Bendigo, the space can be used in conjunction with the adjacent area for breakout activities, which includes computers and a creative workspace. The connection between internal and external space is strengthened through large bi-fold windows and doors, connecting the internal and external workbench area (fig 33-35).

At Keysborough, the school wished to combine four subject areas for 50 students in the START studios. The perimeter benches house facilities for art and science, with sinks, gas taps, fume cupboard and chemical-resistant finishes. Large mobile workbenches can be moved around and positioned to facilitate student groups conducting science experiments. Technology is included through a woodwork bench and metal soldering area. The central demonstration bench includes an oven and stove for food technology cooking. The space includes strong visual connections to surrounding spaces in the learning community through glazing, making learning activities visible.

Croydon Maroondah Regeneration Project includes similar Da Vinci studio spaces in the Year 7-9 learning community. However, for the senior Year 10-12 students, a specialist building for art, science and technology was created (fig 36). The ability to provide multipurpose space at more senior levels is restricted due to the specialised nature of the curriculum at VCE level and the need for more specialist equipment. While this building includes separate rooms for specialist subjects, they’re linked through collaborative and group work circulation areas, providing opportunities for breakout space, social and informal learning areas to bridge across the subjects.

These three projects have different strategies to multipurpose space. The START studio at the Keysborough Springvale Regeneration Project links three speciality areas, whereas at Crusoe Secondary College, the Da Vinci studio links art and science, with the capacity to divide the space and teach separate subject areas. At Croydon Maroondah Regeneration Project, the Da Vinci studio is used for Year 7-9 students, with Year 10-12 students in more specialised art or science spaces.

Reflection on these projects enables me to recognise the challenges in linking traditionally separate subject areas into the same space. Art and science subjects traditionally require more ritualised learning settings and, for interdisciplinary learning to occur, the design of the space and the curriculum needs to work together. It’s not as simple as providing the spaces, teachers need to have training in both the art and science subject areas, or work in teams with teachers who have training in each area to provide guidance and fill subject area knowledge gaps to effectively teach interdisciplinary student projects. These types of spaces can provide challenges for established teaching staff, with the need to re-learn how they approach teaching. Multipurpose space needs to be used where it can be supported and developed through curriculum and teaching practice, and these elements and the capacity for the staff to adapt to the changes need to be considered during design.
Informal learning

In the traditional classroom model, developed in the 19th century, there was a corridor down the middle, with classrooms on either side. Designed to allow students to move efficiently around the school, the corridor was designed primarily for circulation, just wide enough to allow access through the centre, often with low ceilings and limited natural daylight, making it unpleasant to spend time in and encouraging students to hurry through.

In school design, maximising the amount of usable learning space has been driving new approaches to how circulation spaces are designed in schools. Instead of the corridor serving a single purpose, corridors are being combined with teaching space to create new types of informal learning environments for students, such as the ‘learning street’ and Einstein studio.

At the Keysborough Springvale Regeneration Project, the learning street concept expands the corridor to provide space for different activities to occur in the Year 7 and 8 building. These areas act as points of interest and spaces where students can stop and use the area while they move through the building. This slows the circulation pattern to a more leisurely pace, providing opportunities for spontaneous social interactions and informal encounters.
The learning street is designed to be visually interesting and a place that is comfortable for students to dwell in. The learning street runs from one end of the building to the other, working as a social circulation spine (fig 37-38). It’s wide enough in plan to include space for activities alongside clear circulation routes. The learning street is spacious vertically, with high ceilings and voids that provide natural light, visual and spatial connections between ground and first floor. There are also visual connections to surrounding spaces through internal glazing and open planning, where adjacent teaching areas can use the learning street as breakout space for alternative ways of working. The blockwork used externally to the building has been continued down the learning street, but with a honed finish that highlights the diversity of colours in the block’s aggregate. With the high levels of student numbers that move through and use this two-storey space, acoustic ceiling baffles were hung vertically to reduce the spread of noise between areas.

The learning street at Keysborough Springvale Regeneration Project provides a progression of space types for activities such as meeting places, student lockers, access to technology and informal learning. There’s a combination of fixed and moveable furniture, providing flexibility within an intended use of the space. The learning street expands in the middle of the building, where it joins the library, providing a social and informal learning space with kitchenette and display cabinets for exhibition of student work near the building entrance.
The Einstein studio (named after Albert Einstein) is a space concept developed by FNI and inspired by his method of working. It’s a place that’s unprogrammed, designed to support neighbouring teaching spaces such as the Da Vinci studio, providing informal breakout areas and spaces for ‘creative reflection’. Student work is promoted through wall displays and the space can house groups of students working individually or in collaboration. The area is also large enough to gather the whole learning community.

The Einstein studio at Bendigo South East College works as the main entry to each learning community and a place where student work can be displayed. The space is left intentionally unprogrammed so that it can adapt to different functions as needed. This is assisted by different types of loose furniture that can be moved around the space. Large windows provide ample natural light to the space and high ceilings give a sense of openness. Located centrally in the building, the space also connects the different neighbourhoods, buffering between dedicated teaching spaces in the building. The school is designed with four very similar learning communities, one for each level from Year 7 to 10. Post-occupancy, the school has adapted the Einstein studio in each learning community to meet the needs of the specific year level it houses. In the Year 7 building, the large open plan area is furnished for a range of different activities to occur within the one space; whereas the Year 10 building includes a careers centre and Year 10 student-run common room (fig 39-40).

It is important to consider the types of activities needed in the learning street, providing complementary or alternative space types to more formal teaching spaces. There can be a benefit in providing unprogrammed space. The Einstein studio at Bendigo South East College is seen by students and staff as one of the most effective spaces in the school. As the school has settled into the buildings, they’ve been adjusting the layout in the Einstein studio, trialling different spatial and loose furniture arrangements. This interaction with the space by the teachers and students has allowed them to personalise the space and the types of learning experiences that occur in it, creating a sense of belonging and ownership of the space.

The learning street and Einstein studio spaces provide new purpose to otherwise single-use circulation spaces. The spaces highlight the value of providing students with areas that connect social and informal learning activities, demonstrating the importance of these types of spaces to the life of the school.
Architecture and pedagogy poles

Reflection

Reflection through the PhD research has given me greater insight into the complexities of the relationship between architecture and pedagogy. This is recognised as a challenging area, as school buildings in Victoria are designed with a 30+ year lifespan in mind, whereas education theories and pedagogies change far more frequently. This conflict is also discussed by Dudek (2000), with UK schools modernised roughly every 35 years, yet the pedagogy has a far shorter lifespan. For architects, this raises the question: how closely should the architecture be shaped by the pedagogy and what level of flexibility is needed to enable future change.

I have developed a deeper understanding of the capacity for architecture to enable or inhibit different types of teaching practices and the perceived success of a teaching space is not only dependent on the design, but how the space is used by the teachers.
**Architecture pole**

**Extensions, alterations, additions**

With changes in pedagogy and recognition of the role architecture can play to facilitate and support learning, existing school buildings are being redesigned to accommodate new pedagogies. These adaptations range from extensions and alterations to existing buildings, to additions on established school sites.

Established school campuses can accrue building stock over many decades and various funding grants, resulting in a broad collection of facilities. To establish whether existing school buildings should be demolished or retained and upgraded, the cost of investing funds to upgrade is reviewed versus the cost of rebuilding and whether the school would receive the funds for a modern equivalent facility.

St Josephs College is an established campus with a range of existing buildings dating back to the late 19th century that have been well-maintained. The new masterplan reviews existing buildings and outdoor spaces, providing options for the location of new programs. The school size has grown over the years and the campus is located within a suburban area with heritage overlay, restricting future land acquisition by the school to expand the campus. With the limited space on site, recreational and sports activities occur at nearby community grounds and sports facilities and the school was interested in building a facility that could include sports activities on the site. The proposed Gym and Performance Centre provides facilities for school and community use, located at the front of the site, providing a new public face for the school and connecting the school with its community (fig 41).

The Mt Egerton project occurred under the BER Program. The existing primary school contained a picturesque Victorian-era education building. The school received funding for a BER template, to replace an old portable building, but the hilly site had restricted access and none of the BER templates would fit on the site. This worked in the school's favour, as the resultant additions and alterations proposed for the school could then be adapted to accommodate their needs instead of a standard template building, providing a new library, administration and teaching areas (fig 42).

At the Croydon Maroondah Regeneration Project, a community-owned performing arts and sports centre built in the 1970s had been donated to the school. Although rundown and not representative of exemplary architecture from that era, the school decided to retain the facility, as the DET school budgets do not include provision for performing arts centres of this scale. Through the new design, the existing gym area was altered and extended to become drama and music spaces. The addition and minor refurbishment to the existing facade, provides a new public face for the building and a performing arts centre that could be used by the school and hired out to external groups to generate income for the school (fig 43).

Extensions, alterations and additions provide a way of regenerating robust existing education buildings, designed for outdated pedagogies. Underutilised and tired learning areas can be redesigned to create effective teaching spaces that accommodate new directions in the school's pedagogy and enable schools to retain facilities that wouldn't be replaced with a modern equivalent, through current DET funding allocations.
Scale

In Leon Krier’s St Quentin-En-Yvelines school he uses scale to distinguish building types and their role within the school. In both Bendigo South East College and Crusoe Secondary College with HASSELL, the buildings are large-scale. This occurred in plan, where each learning community and associated speciality, was designed to house 250–300 students. This resulted in deep floor plates and the use of clerestory windows to provide natural light to spaces towards the centre of the floorplate. The largeness of the buildings also occurred in their height. At Crusoe Secondary College the use of sawtooth roofs reduced the scale internally and externally. Whereas at Bendigo South East College, the simplicity of the plan and form resulted in barn-like learning spaces, with six-metre- high ceilings. Externally, the large buildings give the sense of being institutional in scale and, internally, some more intimate spaces may have been desirable (fig 44-47).

In comparison, the school buildings at Keysborough Springvale Regeneration Project and Mt Ridley P-12 College with Y2 Architecture also have large floor plates, yet the height of the buildings and form is more intimate in scale. Internally, this provides a range of intimate and large open spaces, creating a greater variety of learning environments for students (fig 48-51).

The difference in approaches to the architecture could have been influenced by the practice’s backgrounds and past projects. HASSELL is one of the largest design practices in Australia, producing many large-scale commercial buildings, with the Bendigo schools the first they’d completed in Victoria.
Whereas Y2 Architecture had a history of more than 25 years in designing schools and an approach of creating more intimate learning environments for students. Reflecting on this has created greater awareness of the need to consider a project’s scale and the impact it has on the types of environments it creates for students.

Materiality and texture
The two practices also took different approaches to materiality and texture. Bendigo South East College and Crusoe Secondary College with HASSELL use FC sheet, precast concrete and glazed bricks. The material approach is a modern palette with a shift away from the familiar school aesthetic of existing lightweight timber and brick construction classrooms. Whereas the Keysborough Springvale Regeneration Project and Mt Ridley P-12 College both use concrete blocks, with lightweight metal or timber cladding.
Reflection

Through reflection on my work in this chapter and the discussion of how architecture has contributed to the history of schools, I’ve sought to illustrate the value of architecture and the contribution it makes to the design of schools.

In the government sector, the process of school design is regulated through guidelines covering items such as procedures, procurement, minimum building standards and some aspirations for design. While there are guidelines in place, and certain requirements to be met, there is also scope for architects to shape the projects and relationship of the spaces. Current DET briefs for area allocations for the architect in designing schools are non-prescriptive and the architect may reallocate spaces to meet the needs of the individual school community, provided the overall building area allocations are met and the project is designed to budget.

The design of school architecture is a specialised field, where the role of the architect assumes a more traditional role central to the whole design process. This can be seen in Victoria, where architects working on government schools are commonly engaged under contract types AS2124 or AS4122, responsible for not just the architecture, but the engaging of all consultants and contractually liable for their performance. The legalities of that position aside, this presents opportunities for the architect to lead the design process, as well as challenges in navigating the complexities of school design (fig 52).

This complex environment has allowed a great deal of flexibility for innovation, with schools in Victoria some of the most progressive and ambitious in the world, experimenting with design for modern pedagogies through creating new space types beyond the traditional classroom.

This has provided a greater sense of the need for leadership from the architect in the design process. In many of my schools the architecture and aesthetics of the project have been of little concern to many of the stakeholders who contribute to the design process. This is understandable, given their prime focus is to ensure the new architecture provides a desirable environment for education. However, a new role for the architect could be to facilitate a greater balance between how the concerns of the three poles inform the architecture. There is greater scope in my future practice to assist the school community in understanding the value of good design, the capacity for it to play a critical role in enabling pedagogy and the importance of spending time resolving the architecture.
For the three key relationship diagram I’ve developed a new understanding of the architecture pole and expanded my original observations and the structure of the diagram to reflect the complexity of the relationships between the poles. The diagram now includes aspirations for the individual roles of the architecture, school community and pedagogy poles. The blurred edges of the boundaries in-between show the relationship between the poles and particular concerns where there needs to be a shared understanding of the aspirations between the poles. The development of the brief is located centrally, and is seen as an outcome from the balanced collaboration between the three poles.

The phrases used in the diagram summarise key items or concerns that have emerged from the research as important to consider during school design. This diagram recognises there is both a dependent and independent role for each pole to play in the school design process, which is discussed in the Pedagogy chapter.

fig 52: Architects from Y2 on site at Keysborough Springvale Regeneration Project, Y2 Architecture.
This summarises my new understanding of the architecture pole and its relationship with the school community and pedagogy poles. In the three key relationship diagram, the red phrases summarise each point (fig 53).

Aspirations for the independent role of the architecture pole:
- There is a need for the architect to provide leadership in brief development and design process.
- The architect needs to facilitate collaboration between poles.
- The design needs to enable pedagogy.
- The design needs to enable the relationship between school and community.
- There is a need for flexibility to accommodate change over the building lifespan.
- There needs to be a conscious approach to design.
- The architect needs to interpret the school community identity and pedagogy.
- The architect needs to evolve the design intent into architecture.

Aspirations for the dependent relationship between the architecture and pedagogy pole:
- Invest in teacher professional development on spatial awareness to develop an understanding of the role of the environment in teaching and potential of the designed spaces.

Aspirations for the dependent relationship between the architecture and school community pole:
- Design the level of flexibility and multipurpose space in the school considering the pedagogy and architecture poles.
- Create informal and social learning opportunities for a varied learning environment.

Aspirations for the development of the brief through collaboration of the three poles:
- Balance between architecture, school community and pedagogy poles.
- Create a hierarchy of priorities to inform the design.
- Design for changes to pedagogy over the building lifespan and consider architecture that can be easily adapted or modified.

While the three key relationship diagram aspires to assist in the development of the three poles during school design, in the articulation of the poles there is a focus towards identifying factors that have emerged from the research as concerns that can play a role in the development of the architecture and the role the architect plays during school design.

The redefined architecture pole has informed the development of the school design tools for the architect, aiming to support a new way of working that can navigate through the complexity of the three key relationships during school design.
fig 53: Three key relationship diagram with architecture pole revised, November 2016.
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3.2 Pedagogy

The Pedagogy chapter focuses on developing my understanding of the pedagogy pole in the three key relationship diagram. This is explored through two case study projects: Dandenong High School by Hayball architects and Mary Featherston; and Bendigo South East College, by HASSELL. My understanding of the learning spaces is informed by the ARC research of Professor Vaughan Prain, who studied the educational outcomes of the Bendigo schools I designed and the role of architecture in facilitating those outcomes. The two case studies are compared through post-occupancy diagrammatic analysis, which documents and communicates the relationship between architecture and pedagogy within the spaces. The diagrams act as a device to understand the interaction between the two and the complexities of the relationship between the physical environment and the teaching and learning within it. The studies reveal a new understanding of pedagogy, the role of architecture, and the intersections where the two interact. This research informed the development of the school design tools for the architect and an understanding of the pedagogy pole and its relationship with the architecture and school community poles.
fig 01: Two alternative design approaches to the traditional general purpose classroom
Introduction

Through reflection on my school projects completed prior to commencing the PhD, I recognised the key role that pedagogy plays in the school design process. Coming from an architectural background, I recognised the need for further research in this area to develop a deeper understanding of pedagogy, to enable it to inform my architecture more effectively. Two case study projects were selected to aid my understanding, including Dandenong High School (Dandenong) by Hayball architects and Mary Featherston (fig 04, 05); and Bendigo South East College (BSE) (fig 02, 03) by HASSELL and Fielding Nair International (FNI).

These projects were designed in the same period under similar circumstances. The Dandenong, Bendigo and Broadmeadows Regeneration Projects were some of the first new government schools to be designed in Victoria under the Department of Education and Training’s (DET) new pedagogy. The design approach to these schools represented a shift from the general purpose classroom as the basis for school design to a broad range of new types of spatial arrangements to facilitate learning. These regions were selected to invest in new schools to improve the educational opportunities for students from disadvantaged backgrounds in low-socioeconomic status (SES) areas.

The DET, at this time, was open to exploring new directions for pedagogy and the architecture of schools, and these projects explore two different approaches to school design. The open plan design approach was used at Bendigo South East College, whereas learning settings were used at Dandenong High School (fig 01). Numerous awards have been given to Dandenong High School for both architecture and educational merit (refer Appendix: Dandenong High School for awards).

In the development of the Bendigo Education Plan (BEP) in 2005 for the Bendigo Regeneration Project, it was recognised that the shift from traditional classrooms to student-centred learning in open plan settings may not be a straightforward process. For teachers, the challenges in focusing teaching towards the learning needs of individual students. "Much evidence exists of a common set of preferences that adolescent learners have, which provides a useful frame of reference. However, matching teaching styles to students' learning styles may not be effective – there are higher levels of interaction, such as relationships, and the nature of the task. Most students are adaptable to instructional modes even if not preferred, provided instruction is well-designed" (BEP 2005, p. 21). The BEP recommends professional development amongst a range of strategies, which aim to assist teachers with the transition into the new open plan spaces and creating a personalised learning approach.
At both BSE and Dandenong, external consultants were brought in to assist the architects, DET and school in bridging the gap between the pedagogy and architecture. At BSE, US-based education consultant FNI performed this role. FNI have an architectural background and, at the time, were working with the DET to advise on new approaches to pedagogy that could be adopted in Victorian schools. At Dandenong, Julia Atkin and Mary Featherston worked with the school and architects during the design stage in this role. Julia Atkin is an education and learning consultant, who specialises in working with educators and schools on the skills needed for learning and how this informs a range of environments. Mary Featherston is a design consultant specialising in learning environments. Her research and design practice focuses on the relationship between contemporary pedagogy and the design of the physical environment.

The post-occupancy diagrammatic analysis of Bendigo South East College and Dandenong High School has been informed by the ARC research project led by Professor Vaughan Prain from La Trobe University, Bendigo. The project, ‘Improving Regional Secondary Students Learning and Wellbeing’, looks at the educational outcomes from the $90 million expenditure on four new Bendigo schools and how it impacted and improved the school communities. Prain’s research was planned in the BEP, so the DET could evaluate the effects of the project. The diagrams were developed through visiting the BSE and Dandenong schools to learn about the schools’ experiences of using the space. I interviewed principals and key staff to obtain feedback and an understanding of staff experience. I also recorded
my observations of the use of the learning spaces through photographic record and sketches. This information was then collated into a series of diagrams that communicated my observations on the relationship between the architecture and pedagogy.

As part of this analysis I was interested in understanding if it was architecture plus pedagogy equals school? Or pedagogy plus architecture equals school? That is, to question whether the architecture drives the pedagogy in school design, or does the pedagogy drive the direction of the architecture. I was interested in understanding how these two relationships work in practice and whether one needs to lead the other during the school design process (fig 06).

PEDAGOGY + ARCHITECTURE = SCHOOL ?

OR

ARCHITECTURE + PEDAGOGY = SCHOOL ?

fig 06: PhD research question.
fig 07: Bendigo South East College site relationships.
Bendigo Regeneration Project

School community

This project developed from aspirations to transform secondary school education in the Bendigo region. In 2005, a steering committee with representatives from six Bendigo secondary schools came together to write the Bendigo Education Plan (BEP), which researched the needs of the Bendigo community and the type of school they envisioned creating. This formed the basis for the Bendigo Regeneration Project, which included four new Years 7-10 middle schools in the Bendigo region. I worked on two of these projects with HASSELL – Crusoe Secondary College and Bendigo South East College. The BEP identified issues that they wanted to improve for the benefit of those in the whole school community, which included the community of the Bendigo region, students and their families, as well as teachers and schools.

For the community, the new schools were viewed as a way of building a stronger sense of community through improving students’ educational opportunities and ongoing support for students. The schools in the BEP are located in a low-SES area, with many students coming from disadvantaged and dysfunctional family backgrounds. There were existing issues with poor student attendance, with a high proportion of students not completing school and relying on government welfare. There were aspirations to build the schools’ relationship with the community through increased use of the facilities outside of school hours as described in the DET’s ‘Schools as Community Facilities: Policy Framework and Guidelines’ (2005). This included an interest in developing community and work-based learning opportunities for students and support through programs that assist in the transition from school to employment or post-secondary education and training. Parents were encouraged to be more involved in their children’s education, with the Bendigo schools adopting frameworks to involve parents. Stronger links were to be created between the school and agencies and government departments to work together on student support services (BEP 2005).

The BEP aimed to improve support networks for students and their families in the community, allowing students to focus on their studies and improve their educational outcomes. For students, the BEP (2005) aimed to meet the educational needs of each student, through providing a more challenging learning environment for high-achieving students and greater support for average, low-achieving and disadvantaged background students. This included an aim to improve the range of subjects available for Years 9 and 10 students, as well as increasing interest and engagement in attending and finishing school.

For teachers, the BEP proposed a radical transformation away from the existing model of education through teacher-led instruction in general purpose classrooms. The proposed pedagogy was developed by FNI, who proposed a community learning centre model, with open plan learning. There were aspirations to develop highly effective teaching through improving teachers’ knowledge and practice in this area. This included improvement in classroom management and discipline. Through these measures the aim was to improve the academic outcomes of students and their overall wellbeing.
For BSE, the range of goals and aspirations for the different members of the school community informed the approach and development of the masterplan (fig 07). FNI’s Community learning centre diagram (fig 08) proposed the school to be a place of lifelong learning through community access to school facilities outside of school hours, with the site open for example from 7am–10pm. This aimed to promote lifelong learning and association with the school. To create a sense of community within the school campus, the buildings are arranged around a central community green, which acts as a social hub for the school.

The 1200 students are arranged into four small learning communities of 300 students, each housing a year level, giving each year level a sense of ownership and belonging to a space within the school. A speciality building is located adjacent to each learning community, giving each one its own identity. Year 7 is grouped with admin, food technology and library, Year 8 with health and fitness, Year 9 with technology and Year 10 with performance. The same material palette is used across the campus, with each community centre and associated speciality building given a different identifying colour – yellow for Year 7; blue for Year 8; purple for Year 9; and red for Year 10 (fig 07).
FNI developed the pedagogy in the BEP and when HASSELL was appointed architect for BSE, FNI became consultants on the project. FNI’s role was to advise on the relationship between pedagogy and architecture. They assisted through reviewing drawings and advising on design changes to create the intended environment for the pedagogy. The ideas that they were advising on were developed in the US and issues with this approach soon emerged. For example, there were differences in the types of spaces built in US schools, the sizes of spaces and budgets. HASSELL attempted to adapt the education model to fit the Australian context, however, FNI were reluctant to adapt the model or assist in finding ways of making it work within the constraints of the DET’s requirements for schools in Victoria. As a result, FNI was removed from the project after sketch design.

For the school community, three schools were coming together onto two school sites. Representatives from all of the Bendigo schools had been involved in the BEP, but as the project progressed it became evident that there was strong leadership from the DET region towards the changes, but not all teachers were on board. There were issues in uniting the teachers from the three different schools as consultation workshops included staff from all three schools, who all had different ideas, objectives and needs they wanted addressed in the new school buildings.

For HASSELL, developing a brief was challenging, with no clear briefing process for how to design these new schools. During brief development I acted as curator, merging the feedback and streamlining it into a consensus that informed the design. The issue with this process is that the more challenging ideas, which require further inquiry, but may lead to a better outcome, can be eliminated in favour of more obvious ideas that the school is already comfortable with.

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**FNI 20 Learning modalities for schools**

1. Independent study
2. Peer tutoring
3. Team collaboration
4. One-on-one learning with teacher
5. Lecture format – teacher-directed
6. Project-based learning
7. Technology with mobile computers
8. Distance learning
9. Internet-based research
10. Student presentation
11. Performance-based learning
12. Seminar-style instruction
13. Interdisciplinary learning
14. Naturalist learning
15. Social / emotional / spiritual learning
16. Art-based learning
17. Storytelling
18. Design-based learning
19. Team teaching / learning
20. Play-based learning

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Fig 09: Learning modalities, 2009, FNI.
(Source: The Language of School Design)
fig 10: Community learning centre, 2012, Bendigo South East College.

fig 11: Neighbourhood within Community Learning Centre, 2012, Bendigo South East College.
Pedagogy
The schools in the BEP have an expected lifespan of 30+ years. While the BEP outlines specific aspirations for the schools' curriculum and teaching, FNI's conceptual approach designs for human need rather than a particular curriculum or current practice, assuming that this will change many times during the building's lifespan. FNI's open plan design allows flexibility in interior arrangements, with the users able to modify the setup for particular activities. The range of learning spaces provide areas for 20 learning modalities that schools need to nurture in students and these learning modalities should be accommodated over the scale of the school (fig 10).

To provide the spaces for the different learning modalities, FNI use a range of different space types. These included the Da Vinci studio, Einstein studio, open plan, Socratic studio and interview rooms. Each of these spaces are intended to accommodate a variety of activities. These spaces promote opportunities for project-based and interdisciplinary learning, where students can approach a project in different ways within the same space.

During the design of this project, the pedagogical intent of FNI strongly informed and drove the design of the architecture, even after they were no longer working on the project. As discussed through the comparative analysis diagrams, many options were drawn to test different arrangements in planning to accommodate the desired pedagogy and the relationships between spaces and buildings. Although keen to develop a new school, the teachers were uncertain and sceptical of the proposed pedagogy and its impact on them. This led to a lot of resistance and challenges for the architects to develop a clear brief in collaboration with the teaching staff.

The design intent of FNI was to create long-term flexibility in the spaces through the use of open plan design. FNI believes it is better to under-design, rather than over-design a space, allowing the school to arrange and adjust the loose furniture arrangements to suit its pedagogical intent, adapting to the school's changing needs over time.

Architecture
Community learning centre
For my research, I focused on the post-occupancy use of the community learning centres (fig 11). There are four community learning centres across the campus, each designed for up to 300 students. The community learning centres act as a home base for students and each centre is attached or adjacent to a specialist facility, creating a strong connection between general learning and specialist subjects. The community learning centre is designed to be self-sufficient and includes a variety of learning spaces, allowing a greater range of educational activities to take place within the same area.
Neighbourhood
In each community learning centre, students are grouped into three small learning communities of up to 100 students in a neighbourhood. Each neighbourhood is an open plan space and shares support spaces with the other two neighbourhoods. The additional spaces include the Einstein studio, Da Vinci studio, Socratic studio and interview room (fig 11).

Neighbourhood as designed
The ‘neighbourhood as designed’ accommodates up to 100 students, with four teachers, and includes a kitchenette within the general purpose teaching space for students to use and to allow wet area activities to occur without needing to move to an art or science room. Staff are located within the teaching space to break down student–teacher boundaries and to provide passive supervision. Connections to outdoor learning areas are created to broaden learning experiences to outside the classroom and provide variation to student working space. The interior arrangement was intended to include different types of furniture to allow for a broad range of activities and learning within the same space (fig 12).

Neighbourhood as used
Currently, the neighbourhoods are used for up to 75 students with three teachers. Spaces are used where one subject is taught and students are divided into three groups based on learning needs and skill level. The kitchenettes are rarely used by students or for wet area activities and interdisciplinary learning. Outdoor learning areas are also underutilised due to supervision issues and the lack of weather protection. The staff work area was not installed in the neighbourhood area and staff currently use a Socratic studio as their staff area for separation from the students. Within the neighbourhood, the school has divided the space into three areas and arranged the loose furniture to support the pedagogical practice (fig 13).
fig 12: Neighbourhood as designed, 2007, Bendigo South East College.

fig 13: Neighbourhood as used, 2012, Bendigo South East College.
Build it
The build it group is focused on assisting the low-achieving or struggling students through providing a structured and supportive small group environment, with team collaboration and one-on-one learning with the teacher. The furniture is arranged to support this practice through group discussion and working with peers. This group is located in the ends of the room, with the least distractions for disengaged students (fig 16).

Ask two before teacher
The ask two before teacher group is setup to build the competencies of mid-level students. As the group name suggests, these students are encouraged to collaborate and learn from the knowledge of their peers, asking two other students before approaching the teacher (fig 14).

Independent
The independent group is designed for stronger students, who can work independently with minimal supervision. This is a large group of students setup in the teacher-directed learning format. The independent group space is located in the centre of the room, as these learners are less distracted by what’s going on around them (fig 15).

fig 14: Ask two before teacher group spatial arrangement, 2012, Bendigo South East College.

fig 15: Independent group spatial arrangement, 2012, Bendigo South East College.

fig 16: Build it group spatial arrangement, 2012, Bendigo South East College.
The post-occupancy observation of these spaces revealed large gaps between the pedagogical intent and how the spaces are currently used. During design stage, the buildings had been planned with particular types of loose furniture and arrangements to facilitate the intended pedagogy. However, the final selection of the loose furniture is not part of the architect’s scope in the DET contracts and it’s up to the school to purchase these items. The issues with this arrangement are apparent at Bendigo, with the school purchasing furniture that’s very different from the design intent.

Consultation with the principal and staff provided insight into the reasoning behind the school’s use of the spaces. The teachers have come from a traditional classroom model of one teacher per 25 students, so the shift to the open plan spaces and team teaching has been a massive change to their teaching practice. In moving from traditional classrooms to open plan spaces, the school has been trialling different setups for how to structure the learning experience in open plan space (fig 17). The school sees the current setup as a transitional process for both the students and staff to work towards a more diverse project-based pedagogy. This feedback from the school provided perspective on the slowness of implementing change to teaching and learning practice and the need for it to occur incrementally for the BSE school community.
fig 18: Ask two before teacher group - Relationship between pedagogy and architecture, 2012, Bendigo South East College.

fig 19: Build it group - Relationship between pedagogy and architecture, 2012, Bendigo South East College.
Graphic technique

In my post-occupancy analysis of these spaces I’ve experimented with a number of techniques to document and communicate my observations of the use of space as a way of understanding the relationship between the architecture and pedagogy. I found that the perspective floor plans (fig 10) were useful in explaining the overall planning relationships and spatial layout, but didn’t provide much more of a reading of the interaction between pedagogy and architecture than a 2D floorplan. Including annotations or photographs around these drawings (fig 13, fig 17) clearly communicated information about the intention of the space to the viewer. However, the viewer still needs to make the connection in their mind between the plan and the image or text, rather than it being clearly visible. The use of text annotations overlaid on photographs seemed the most useful for developing my own understanding and communicating the intricate relationship between the architecture and pedagogy (fig 18-20). This technique was developed from looking at the architecture masters research of Finn Pederson, director of Iredale Pedersen Hook Architects. In his research, he developed a technique of annotating photographs to analyse how Aboriginal communities use and understand space in designing new architecture for Aboriginal communities (fig 21). Through this post-occupancy analysis, I developed a greater understanding of the strengths and weaknesses of various graphic techniques in communicating different types of information.
Prain’s ARC research on BSE and the other schools in the BEP, allowed the school to understand and reflect on how they could best use their new spaces. Prain’s ARC working paper, ‘Learning in Open Plan Schools’, focuses on ‘the literature around the rationale, claimed effects and challenges of using the physical learning spaces to support effective learning’ (Prain 2012). In this paper, Prain discusses the open plan layouts and the affordances to teachers and students in how they use the space. As an architect I was interested in understanding this research further and its implications for architects designing schools.

The paper is written by education academics using terminology for an audience of educators, with the relationship between the analysis of the use of the space described through words, with no visual representations of the actual spaces, such as diagrams, photos or drawings. Without visual links to the spaces studied, I found it challenging to understand the potential implications of the research for architects and so I created a series of diagrams that aim to connect some of the research findings with the open plan spaces to assist in my own understanding of the types of pedagogical activities open plan spaces support. The diagrams aim to expand the reading of the space and how it’s used, rather than providing a precise link between the drawings and Prain’s research findings.

**Staff enablers**

In the change from the old school pedagogy of one teacher per 25 students to team teaching of three teachers per 75 students, the teachers noticed an overall improvement in student behaviour. This was attributed to an increase in the teachers’ ability to monitor the students (fig 22). In the old spaces, if a student was being disruptive, the teacher may have sent the student to the principal’s office, as they had 24 other students to teach. The new spaces enable one teacher to pull the difficult student aside and address the issue, with two other teachers within the space to monitor the remainder of the group. This enables teachers to more effectively assist students with behaviour issues when they arise and before it becomes a big issue that disrupts the whole group. The open plan spaces have led to noticeable improvement in student behaviour.

The shift from one teacher in a classroom with students to an open plan learning space, where teachers work with two peers, has increased staff professional development, allowing teachers to observe and develop new teaching practices from each other. Three teachers working together each have a different approach and set of skills in teaching. Working as a team allows the teachers to teach to their own strengths and work on their weaker areas through observing other teachers’ approaches to teaching. This has allowed teachers to develop problem-solving skills, patience and people management skills.
Open plan allows teachers to observe each other’s teaching practices and learn from each other.

Teacher can pull a student aside and deal with an issue immediately, with other teachers able to observe student group.

Reduction in students going to principal’s office.

Teachers have developed problem-solving skills, patience and people management skills.

Increased Teacher presence in room. Maintaining safe supervision and monitoring whereabouts of students.

Daily pastoral care with students.

Teacher role can become more than controlling learning experience / information.

Teachers value each other and feel valued themselves.

Increased noise and distraction.

Loss of intimacy and structure.

More scope to work with teacher’s individual skills, working with students.

More scope to work with teacher’s individual skills, working with students.

Maintaining safe supervision and whereabouts of students.

Exposed to the gaze and critique of colleagues.

Adjusting to the practical realities of inhabiting these altered environments.

Developing practices that enhance teacher wellbeing.

Providing a sustainable, rewarding framework for long-term education participant gains.

Fig 22: Staff perception of enablers informed by Vaughan Prain research, 2012, Bendigo South East College.

Fig 23: Staff perception of constraints/ongoing challenges informed by Vaughan Prain research, 2012, Bendigo South East College.
Improved student learning results

Improved student behaviour with increase in teacher monitoring

The improved behaviour has now become the expected behaviour

Respect of spaces. Students enjoy being in open plan spaces

Increased respect for students and teachers

Extended sphere of influence for students

Students learn from each other

More flexible student groupings

Opportunities for more social interactions

Daily pastoral care and personalisation of learning

Increased noise and distraction

Demands for new team and individual skills

Potential loss of connection

Loss of intimacy of traditional teaching environment

Loss of spatial structure of classroom

Exposure to the gaze and critique of colleagues

More collective monitoring of student behaviour

More informality

Ongoing challenges to students

Adjusting to the practical realities of inhabiting these altered environments

Developing practices that enhance student wellbeing

Providing a sustainable, rewarding framework for long-term education participant gains

fig 24: Student perception of enablers informed by Vaughan Prain research, 2012, Bendigo South East College.

fig 25: Student perception of constraints/ongoing challenges informed by Vaughan Prain research, 2012, Bendigo South East College.
Staff constraints
For the staff, the shift to team teaching has been a significant change to previous teaching practice, requiring support from the school leaders to assist in the transition (Prain 2012). For some teachers there are concerns over the increased exposure to gaze and critique of colleagues.

In the classroom, walls contain the noise and create an intimate structured environment to learn in. In open plan spaces, the removal of the walls and an increase in the numbers of people within the space has increased the noise and distraction, with a loss of intimacy and structure (fig 23).

The external doors that were added to create opportunities for students to work outside, has been challenging in practice, with teachers finding it hard to supervise students inside and outside at the same time. In a single classroom there is one door to enter and exit the space, however, in the new open plan spaces there are six potential exits a student may slip out of, which has been challenging for the teachers to monitor.

Student enablers
Through team teaching and multiple groups of students, learning can be targeted to the needs of individual students with a wider variety of learning occurring within the open plan space. The open plan enables the observation of students in other groups through their proximity and a greater degree of peer-to-peer learning. Learning groups are no longer separated by walls, increasing learning opportunities and creating the capacity for students to have a greater influence on one another. Prain (2012) discusses that the initial improvement in student behaviour has now become the expected behaviour and there is an improvement in academic results and the quality of interaction between students and staff (fig 24).

Student constraints
For students, the loss of the intimacy of the traditional classroom and an increase in the noise, and potential for distraction, is perceived by some as a loss of connection (Prain 2012). This particularly affects the Year 7 students, adapting from a smaller primary school environment. The school's approach of creating three student groupings within the space is an attempt to structure the learning experience within the open plan space to assist the students with these issues (fig 25).
Reflection

The staff and students’ experience of transferring to the new spaces provided insight into the hesitation and resistance expressed by staff to the proposed open plan spaces during design. As architects, we lacked an awareness of the scale of the change for the students and staff and the impact on their activities in transitioning to the new learning spaces.

Prain’s research gave me a deeper understanding of the issues that informed the spaces and the nature of the relationship between pedagogy and architecture. The diagrams illustrate the loose connection between the architecture and how the spaces are used in practice, highlighting gaps between the design intent and actual spatial occupancy. The pedagogy needs to adapt to the environment. Prain discusses ‘New buildings alone are insufficient to change pupils’ attitudes and behaviour. The real challenge is to link the transformation agenda to changes in pedagogy and leadership’ (Alexander 2010, p. 9 in Prain et al. 2012, p. 6). Finding a match between the pedagogy and teaching environment is an ongoing challenge for the school, working through this time of adjustment to the new spaces.

Da Vinci studio as designed

Prain’s findings provided a greater understanding of the relationship between the pedagogy and the architecture. This allowed me to apply what I’ve learnt about the use of the neighbourhood spaces to create a deeper reading of the use of spaces in other areas within the school (fig 26).

The Da Vinci and Einstein studios serve a different pedagogical purpose to the neighbourhood spaces and are centrally located for use by the whole community centre. The Da Vinci studio is intended for interdisciplinary learning between art and science, with a view from FNI that the study of these areas will become more closely linked in the future. The grouping of subject areas is perceived to have other benefits for the school. Traditionally, art and science are housed in separate specialist facilities, combining the disciplines into one space increases the room’s frequency of use and creates better utilisation of the school’s facilities (fig 28).

Da Vinci studio as used

The school currently uses this space for separate art or science subjects, rather than interdisciplinary learning, where students can study a subject through art or scientific approaches (fig 27). For the school, it’s not as simple as deciding to take an interdisciplinary approach to learning. There needs to be expertise amongst the staff members with training in both art and science, together with an interest and willingness to teach in this way, as art and science require more ritualised learning settings.
Einstein studio as designed
The Einstein studio is designed to work with the Da Vinci studio, providing a space for students to step away from the more formal learning spaces, to encourage reflection and inspiration in a more relaxed learning environment. The space was designed as open plan, with flexible furniture layout to allow different ways of working (fig 29).

Einstein studio as used
As the school has settled into the spaces, it has been adjusting the loose furniture over time as staff and students identify the need for more specific learning experiences (fig 30). Prain (2012) discusses this interaction with the space by the teachers and students as important for personalising the space and creating a sense of belonging. This has resulted in the creation of learning settings for different educational experiences within the Einstein studio.

Reflection
The Da Vinci studio is not currently used in an interdisciplinary manner, however, the school is interested in working towards this over the long term, as the interest and expertise of staff is developed at the school. The design of the space is flexible enough to allow the teaching of art or science in the short term. This highlights that the success of a space relies on the willingness of the teachers and students to embrace new ways of learning and that they can and will resist the design intent of the architecture. However, through the design of this multipurpose space, the school can achieve a higher utilisation of this learning space, which allowed for the creation of other learning areas within the school which they otherwise wouldn’t have had.

The Einstein studio was designed as an unprogrammed space yet it’s seen as one of the most successful spaces in the school, as the students and staff have been able to adapt its internal fitout and use over time. This highlights the value of informal learning spaces and its potential value in school design.
fig 27: Da Vinci studio as used, 2012, Bendigo South East College.

fig 28: Da Vinci studio diagram, 2005, FNI. (Source: The Language of School Design)
fig 29: Einstein studio as designed, 2012, Bendigo South East College.

fig 30: Einstein studio as used, 2012, Bendigo South East College.
Bendigo South East College reflection
The post-occupancy work at Bendigo South East College revealed gaps between the pedagogy that informed the design process and the way the school occupied the space after completion.

In my three key relationship diagram, I observed that there needed to be a commitment to a pedagogy by the school community. I’ve come to understand, through Prain’s research, that it’s more complicated than just getting the school to commit to a pedagogy.

In Prain’s research on the Bendigo Regeneration Project (Pain et al.) he discusses the ability of teachers and students to adapt to new types of learning experiences depends on the culture and history of the school. He identifies that assumptions were made about the capabilities of the students and the dispositions of the teachers.

Although extensive consultation sessions between HASSELL and the school were undertaken, only partial collaboration was achieved. As discussed in the Reflective Practice and School Procurement chapter, there was a lot of top-down enforcement of ideas within the stakeholder group. This suggests that the design procurement is not just about ticking the boxes and going through a particular process, but rather about genuine collaboration by all parties.

At BSE, the school took a visionary approach that proposed radical changes. However, once the new school was occupied, the gaps between the design intent and post-occupancy use illustrate that the design was ahead of where the school community was at.

For the interaction between teachers and students within the space, the open plan design of the school has allowed them to structure the learning experiences within the open plan through changing loose furniture arrangements. Prain describes that the open plan spaces create visibility and exposes the practice, which helps rather than hinders students’ needs.

The relationship between the architecture and pedagogy needs to be understood as part of the school design process. Prain discusses that the pedagogical structure needs to align with the architectural structure, with the architecture serving as a prompt for pedagogical changes. Currently at BSE, the use of the space differs from the design intent. However the flexible approach to planning will accommodate many changes in pedagogy over the school’s lifespan.

Reflection on my work at BSE highlights issues in the design process and the need for a new method of working in my practice that assists in developing a greater understanding of the relationship between the architecture and pedagogy during the design phase and creating a better alignment between them.
fig 31: Community learning centre - Year 7, 2012, Bendigo South East College.

fig 32: Community learning centre, 2012, Bendigo South East College.

fig 33: Learning community Da Vinci studio, 2012, Bendigo South East College.

fig 34: Community green, 2014, Bendigo South East College.


fig 36: Dandenong High School, 2009, Hayball. (Source: refer above image) Collaborative work area.

fig 37: Dandenong High School, 2009, Hayball. (Source: refer below image) Indoor-outdoor space.

Dandenong High School

School community

Now we shift to the case study project of Dandenong High School by Hayball and Mary Featherston, which has won numerous awards for both architectural and educational merit. Similar to BSE, Dandenong is located in a low-socioeconomic area, with a similar budget, and likeminded aspirations for rejuvenating education in the community. The drive for the Dandenong Regeneration Project came from the schools themselves – Cleeland Secondary College, Doveton High School and Dandenong High School. There was initially some hesitation to merge the three schools together, but demographic studies and curriculum audits revealed that none of the three schools had a comprehensive curriculum (Dunn 2012).

Dandenong High School was the largest and academically strongest of the three schools that merged and the challenge for Dandenong was to ensure that merging with two smaller and weaker schools didn’t lower current academic standards. Dandenong High School’s school principal took on a leadership role in directing the merger and uniting the three schools with different cultures to create a shared project vision.

The new Dandenong High School is designed to accommodate 2000 students. Like BSE, a number of students were from disadvantaged backgrounds, with 90 percent of families on low incomes and receiving the Education Maintenance Allowance. Some families are unable to afford textbooks and uniforms, which the school provides assistance with. Furthermore, English is a second language for 80 percent of its students. One third of the students are refugees, with many having interrupted or no schooling at all. Some students arrive at the school not only unable to speak English, but completely illiterate. Student performance was poor and the aspiration of the new combined school was to improve students’ learning outcomes.

Culkin saw his role in the project to create a new school that could provide the right kind of education environment to offset the complexities and challenges of this particular school community. The students had become increasingly disengaged and teachers wanted to improve students’ academic results. To assist in addressing this, the school principal wanted to create a school that would give the students a more disciplined and high expectation environment, with compulsory school uniform.

fig 41: Dandenong High School - Values and beliefs about collaboration for learning, 2011, Julia Atkin and Martin Culkin. (Source: www.slideshare.net).
School community in masterplan

While the design outcomes of the two case study schools is different, there are similarities in the ideas that informed each campus design. Dandenong uses the same approach of grouping students into community centres, with each building housing two levels for up to 150 students each. The approach to the campus design has similar aspirations of wanting to create a sense of community within the campus plan, arranging the community centres around a shared outdoor space (fig 39). To create a sense of community within the culturally diverse student population, the school chose the SWIS (schools within schools) vertical learning model, creating seven community centres across the campus for Years 7–12. This provides the students a building on campus where the majority of their learning takes place until VCE, giving them a sense of belonging and ownership over a space within the larger school community. Like BSE, specialist subjects are located in separate existing buildings. The same material palette is used across the school to give it a sense of unity, with a unique colour given to each community centre of Banksia, Callistemon, Darwinia, Eucalyptus, Fern, Grevillea and Hakea.

Working with school community

For the school community, there were challenges in creating a school design they were happy with. Initially, the DET appointed an architect to design the plans, but Culkin felt the school needed a more radical approach for a complex school with so many layers of disadvantage (Dunn 2012). At this stage, three of the school principals conducted an international research trip for ideas on an approach for their school community. Dandenong spent two years developing a shared vision, values and practice for the new school, with Hayball initially observing the discussions of the school community to understand their needs before commencing design work.

Hayball, Atkin and Featherston conducted extensive consultation sessions with the school community during design stage. Culkin commented afterwards that the process of developing the new Dandenong High School was challenging ‘and it wasn’t a very pleasant process’ (Dunn 2012, p. 2).

Pedagogy

At Dandenong, the pedagogy was developed out of the school community’s vision and values. The school spent two years developing this before design even began. Atkin worked closely with Culkin and spent a lot of time understanding and observing the practices of the students and teachers in the existing schools. Atkin believes ‘that the best idea and the best design will emerge if you have good process and openness of dialogue’ (Newton & Fisher eds 2009). This collaborative approach formed the basis for the school community’s shared vision. She developed the school community’s value of collaboration into principles about education and how this worked in practice (fig 40-41). This process allowed the school’s pedagogy to evolve out of the values of the school community.
Developing pedagogy

Mary Featherston developed the school’s vision, values and practices into learning settings. Featherston’s approach to school design is informed by her research on the Reggio Emilia schools in Italy, which view architecture as the third teacher, playing a critical role in learning. Featherston’s interest lies in creating the richest possible education experience to motivate and inspire students, which is, in turn, rewarding for teachers. The design of the learning settings is informed by identifying the type of education experience you want to create and what you need to support this in the physical environment (fig 42). This developed into a collection of learning settings, which formed the basis for the plan. The environment suggests the intended space use, with students and staff moving between spaces that are purposefully designed for each educational activity. At Dandenong, Featherston had a different approach to providing flexibility in learning arrangements. At BSE, FNI provided a shell that enables teachers to adjust interior arrangements as needed. Whereas Featherston believes ‘an interior environment that is relatively permanent rather than totally flexible saves teachers time and energy that would otherwise be spent in negotiating the changing use of space and then in physically scene shifting. Stability means that everyone knows where things are – important in a very dynamic and unpredictable progam’ (Featherston 2010).

Architecture as designed

After two years, Hayball was under pressure from the DET to begin construction. The school was still firming up their pedagogical intent and its relationship with the architecture. To meet the construction deadlines, Hayball designed the shell of the learning centres to carry the structural loads, with non-load bearing internal walls to give the school more time to resolve their pedagogy, which would inform the design direction and finalise the internal layout.

Atkin worked closely with staff, students and parents to adapt to the changes and transition during the development of the school and to include the school community in the journey. She observed that through consultation sessions, the school community struggled to envision a new school design beyond the standard classrooms that they currently used. Atkin, Featherston and Hayball then worked together with the school to design a prototype space in existing portable classrooms. This enabled the school teachers and students to trial different spatial arrangements and understand their relationship with new types of pedagogy. This allowed the whole team to experiment and it gave them confidence in their intended pedagogy and spatial arrangements (fig 43).
What is the education experience that you want to create?

What is needed spatially to support this for:
- acoustics
- IT infrastructure
- lighting
- fixed services
- relationship to outside
- visual connection
- size of group
- loose furniture
- configuration

fig 42: Mary Featherston learning setting brief development approach, 2008, Mary Featherston Design (Source: Mary Featherston Design)

Basic learning setting diagram:
- Classrooms/Workshops (20-25)
- Pastoral Care Group & Whole Group Meetings
- Targeted Teaching (6-10)
- Lounge/Reading (6)
- Classroom/Workshop
- Lounge/Reading/Relax
- Staff Prep

fig 43: Dandenong High School Prototype, 2007, Mary Featherston Design. (Source: Mary Featherston Design) Learning areas and circulation (top), design drawing (bottom).

Architecture

Learning centres
I’ve adopted Prain’s observations for open plan space and applied the same approach to an analysis of the relationship between pedagogy and architecture at Dandenong. I’ve focused on the learning centre, which has similar design intentions to the community centres at BSE.

The Dandenong learning centre is also designed for 300 students, breaking the cohort into two smaller learning communities of up to 150 students on each level. The SWIS vertical learning model uses the approach of ‘houses’ to give the students a home base for the majority of their learning activities, with specialty subjects held in separate existing buildings. There are 50 students from each of the year levels (Years 7–12), who have an association with their house for the duration of their schooling, creating a sense of belonging within the large school (fig 44).

First floor and Year 7 area
The first floor contains a Year 7 area, making and doing space and traditional classroom spaces for up to 150 students (fig 45). The Year 7 area is designed to give students their own space within the large school. Prain (2012) identifies the shift for students from a small primary to a large secondary school as a huge change, creating a sense of ownership to an area assists with this transition. There are three teachers for the 50 students, with one teacher supervising students in each of the three spaces (fig 46-49). The areas are designed for specific activities and the teachers and students move to different spaces for particular activities, rather than adjusting each space. The learning settings also serve to prompt use of space for the teachers and students.
fig 46: Year 7 Large group and teaching spaces, Dandenong High School.

fig 47: Year 7 Conference, technology, collaborative spaces, Dandenong High School.
(Source: Dandenong High School: Learning Centres: Learning Spaces)
fig 48: Year 7 Community of inquiry space, Dandenong High School.
(Source: Dandenong High School: Learning Centres: Learning Spaces)

fig 49: Year 7 Digital production, relaxing and reading spaces, Dandenong High School.
Making & Doing
Individual & Collaborative
Total 50 Students
Teaching Total 50 Students
ENTRY Toilets
Total 50 Students
Year 7

fig 50: Years 7-12 Making and doing, individual and collaborative spaces, Dandenong High School.

fig 51: Years 7-12 Making and doing, individual and collaborative spaces, Dandenong High School.
fig 52: Years 8-12 Large group and teaching space, Dandenong High School.

**Large group and teaching space**

Within the learning settings, there is still a need for more traditional classroom spaces, with two classrooms separated by an operable wall. While an operable wall is included, the school likes to keep it open and use the space for 50 students with three teachers, adjusting the space for different working modes, such as teacher-led instruction, individual, pair and group work or class discussion. The space provides acoustic privacy from adjacent areas, but with strong visual connections through internal glazing, enabling focused work (fig 50, 52).
fig 53: Years 7-12 Digital production, relaxing and reading spaces, Dandenong High School.

fig 54: Years 7-12 Making and doing space, Dandenong High School.
Making and doing / collaboration area / inquiry

The making and doing and collaboration areas can be used together by the one group of 50 students with three teachers.

The design intention of this space is similar to the Da Vinci and Einstein studios, with make and create designed for art/science/technology activities and the collaboration area designed as a breakout area for group and individual work (fig 51, 53-55).

The spaces are mostly used by Years 7–9 students, with Years 10–12 students requiring more specialised areas, leaving the learning centre to utilise the existing specialist buildings.

The collaboration area connects with the inquiry space, which includes a raised platform with no furniture. The inquiry space is intended for other activities, such as speaking, listening, reading, collaboration, construction and robotics. The collaboration area is surrounded by other learning settings, such as the small group area, conference space, relaxing and reading area. This enables various student activities to occur simultaneously, with teachers moving between groups of students.
fig 56: Large group and teaching spaces, Dandenong High School.

LARGE GROUP AND TEACHING SPACES
DANDENONG

Explicit instruction
Student presentations
Teacher-led learning
50 students
Rotating through activities
Collaborative learning
Inquiry – integrated and thematic learning
Floorboxes
Teacher
Teacher
Operable wall stays open
Flexible Furniture
Individual reflective work and tests

fig 57: Community of inquiry, construction, robotics, Dandenong High School.

COMMUNITY OF INQUIRY / CONSTRUCTION AND ROBOTICS

Whiteboard
Speaking
Listening
Reading
No furniture on raised platform
Collaborative small groups
Construction space
ILP entry
Production of documents and
Student pairs researching
Production of
documents
Accessing software
programs
One-on-one
or one-to-two explicit
Writing, reading, discussion and negotiation
Pair discussion and project work
Focused independent research
Two large square tables

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Like BSE, the success of the spaces still relies on the willingness of the teachers to use the spaces as intended. The Age newspaper published an interview with Culkin in 2013. The interviewer wrote: ‘Not everyone likes this way of teaching. Culkin estimates that he has about six teachers who are outspoken in their dislike of the team teaching, and another eight or nine who rail against it more quietly’ (Dunn 2013).

Culkin has approached these issues with strong leadership, innovation, discipline and professional development for the teachers on how to use spaces. Culkin also uses discipline as a strategy, to lift the behaviour of the students and unite the culturally diverse student population. ‘Given the range of ethnic backgrounds, including those from groups that have been warring in their homelands, Culkin says that remarkably little ethnic tension makes its way into the school … We’ve also had a view that you don’t do this stuff. This is not part of our broad culture. We don’t just sit back and let it happen … I’ve provided a very forceful viewpoint to some families over the years’ (Dunn 2013). In the learning spaces, the school has been able to provide three teachers to 50 students through additional funding for disadvantaged students, which has seen a dramatic improvement in student learning outcomes. The greater teacher to student ratio provides the opportunity for an improved teacher–student interaction and the capacity to teach to students’ individual learning needs.
**Reflection**

Bendigo South East College and Dandenong High School were designed and built at the same time and for similar types of school communities. HASSELL and Hayball are both award winning architectural practices, yet Hayball won a number of awards for both architecture and education, HASSELL did not. This suggests that designing effective school architecture is not only about the choice of architect, but also other factors and processes.

In the design of both schools an educational consultant was brought on board to assist in understanding the relationship between pedagogy and architecture. At Bendigo South East College, US consultants FNI used their pedagogy, which views school design as a series of recurring design issues that its model addresses. In its application, it doesn’t respond to the local context and has non-local agendas. However, when used at Bendigo South East College, this approach didn’t fit within the DET standards. Through extensive consultations with the school, the FNI model was ‘bastardised’ to fit the Victorian context, meaning it wasn’t a pure representation of their pedagogy.

At Dandenong, Mary Featherston was brought on board to assist in the translation of the pedagogy to architecture. Her pedagogy is also not pure in its application, being a ‘bastardisation’ of the Reggio Emilia pedagogy for elementary schools in Italy or ‘Reg Miller’ as she calls it. Through extensive consultations, school ideas from Reggio Emilia were adapted to a secondary school in Victoria.

Both Bendigo South East College and Dandenong High School are in low-SES areas, and have seen measurable improvement in their student learning outcomes through standardised tests such as NAPLAN. Each project advocates a different pedagogical model, of open plan learning at Bendigo South East College and learning settings at Dandenong High School. At this stage the jury is still out on which pedagogy is more successful, but this may be measurable over a longer period of time.

Bendigo South East College and Dandenong High School both faced similar issues and challenges during the transition to a new pedagogy for the school community. A key difference I observed was the approaches used to work through and address these challenges. In designing the new school, Hayball, Mary Featherson, Julia Atkin and Martin Culkin challenged traditional procurement methods used for school design and developed a model based on a collaborative approach, with the design developed for this particular school community. Recognition of this approach has been influential on my own research and the development of the school design tools for the architect.

Dandenong High School’s collaborative approach throughout design provided the school community with a deeper understanding of its school identity and its pedagogy. This assisted in alleviating some of the deficiencies experienced in Bendigo South East College, identified through Prain’s observations, on the assumptions made about the capabilities of the students and teachers and the lack of alignment between the pedagogy and architecture to create a shared project vision for the school.
Through reflection on the research for the pedagogy pole, I've recognised that there can be strengths and limitations to each pole. The research showed that it can be challenging for stakeholders and teachers to provide feedback to architects on school design, as they may find it challenging to read architecture drawings or have limited knowledge of the role of the school environment in enabling pedagogy. The research emphasises the importance of the architect to lead the school in the design process and find ways of communicating with and engaging the school community, so they can actively participate in the design journey and feel they have ownership over the design.

At the start of the pedagogy pole research I was aiming to develop a better understanding of the relationship between the pedagogy and architecture poles, and if one drove the other (fig 59). I've come to realise that the relationship between the two is more complex than I first thought. The second diagram (fig 60) is an early attempt to communicate the shift in my understanding of the complexities of the relationship into three parts. This led to my understanding of the dual roles for each pole in the school design process, where each pole is both dependent and independent of the other poles.
Recognition of the complexity of the relationships between poles informed the evolution of the three key relationship diagram into the current structure (fig 61), which separates the poles into dependent and independent aspirations in the school design process.

This summarises my new understanding of the pedagogy pole and its relationship with the school community and architecture poles. In the three key relationship diagram, the red phrases summarise each point.

Aspirations for the independent role of the pedagogy pole:
- Create education principles that underpin the approach to pedagogy.
- Develop learning culture for the students.
- Develop pedagogy to meet the education needs for each student.
- Improve the learning outcomes and wellbeing for students.
- Create rich learning experiences to motivate and inspire students.
- Develop aspirations for interactions between teachers and students.
- Develop students confidence and responsibility for own learning.
- Develop student identity and whole person.
- Incorporate collaboration in teaching and learning.
- Develop the structure of learning in time (timetables).

Aspirations for the dependent relationship between the pedagogy and school community pole:
- Develop school leadership to support pedagogy.
- Build on the history and existing cultures within the school.
- Invest in teacher professional development on pedagogy to assist in evolving teaching practices.
- Plan change transformation with achievable goals.

Aspirations for the dependent relationship between the pedagogy and architecture pole:
- Develop space types for a variety of teaching and learning.
- Consider role of architecture and loose furniture in enabling pedagogy.
- Develop understanding of functional requirements to support learning activities.
- Develop relationship between pedagogy, curriculum and architecture.

Aspirations for the development of the brief through collaboration of the three poles:
- Practice collaboration between poles during school design.
- Develop a project vision for each pole and a shared project vision.
- Develop a common language for communication between poles and to assist in facilitating discussions.

The new understanding of the pedagogy pole has informed the development of the school design tools for the architect, which aim to assist the architect in understanding the pedagogy pole for individual school communities.
fig 61: Three key relationship diagram with pedagogy pole revised, November 2016.
References


3.3 School Community

The research on the architecture and pedagogy poles revealed new layers of complexity in facilitating the collaboration and building of relationships between the poles in the school design process. The School Community chapter focuses on developing my understanding of the role the school community plays in school design, which is the third pole in the three key relationship diagram. The issues of school identity and values and the role of the school within the broader community are explored through projects with an existing school community at Sandringham College. The project types range from a Masters of Architecture Design Studio, the Facades project and the School Design Adviser role. Through these projects I started to test and develop new ways of working with the school community to develop a brief and how this evolves into architecture. Reflection on this work revealed the need for a new design process in my practice and formed the basis of the proposition for the school design tools.
fig 02: Sandringham College (SC) Administration Building, Art Deco style, circa 1940s.

fig 03: SC Administration Building, Art Deco style, circa 1940s.

fig 04: SC Performance and Gymnasium, circa 1970s and 1990s.

fig 05: SC Art Building, prefabricated modular construction, circa 1950s.

fig 06: SC Food Technology Building, lightweight cladding timber construction, circa 1960s.

fig 07: SC Maths Building, prefabricated Bristol, circa 1950s.

fig 08: SC Commonwealth Library, circa 1970s.

fig 09: SC Canteen, lightweight cladding, steel construction, circa 1990s.
Introduction

The research into the school community pole has been conducted through a series of projects with an existing school community. Sandringham College was looking to embrace change, keen to bring about new architecture, which would introduce modern education opportunities and establish a new school identity within the broader community located bayside in a middle class suburb southeast of Melbourne (fig 02-09). The existing school buildings were mostly traditional, general purpose classrooms, which restricted the use of a broader range of modern teaching practices that could occur within the spaces. The buildings themselves were rundown and in need of maintenance, and presented a collection of the history of education architecture in Victoria from the 1940s through to the 1990s. Through a series of seemingly unconnected projects and interactions with the school I was able to generate a broader understanding of the role of the school community in the design process.

The different projects with Sandringham produced a broader range of briefing information and insight than I’d experienced working through the school design process in the structured linear way I’d previously used. In school projects, such as Mt Ridley P-12 College and Keysborough Springvale Regeneration Project, short timeframes for the design stage, meant we were restricted in how much time we could spend exploring new architectural ideas. We needed to work efficiently, focusing consultation sessions towards extracting the types of information that were essential to the architecture design process. Our experiences of designing other schools formed the basis of our knowledge and was shaped by the school’s particular needs. The focus was around pragmatic considerations, such as the types and numbers of spaces, subject relationships and any special material or spatial qualities required. A lot of time was also spent understanding the types of equipment, fittings and joinery that the spaces needed. This information was collected in a functional briefing document, which was effectively a return brief, outlining the detail of what would be provided.

The Sandringham projects represented the opportunity to work with a school community without the time constraints of a procurement program. Instead, I hoped to be able to spend time getting to know the school community, creating a relationship, and developing an understanding of their needs so that it could inform the architecture. I was interested in developing design strategies that evolved from the interaction with the client, rather than generic ideas adapted to a client’s needs. I wanted to design schools, where the design was specifically owned by that community, such as in the case study precedents Preshil and Melbourne Grammar School. In these projects, the schools had a very strong sense of their own identity, which strongly shaped and influenced the design of the architecture. Through the projects with Sandringham, I was interested in trying new ways of working and engaging with the school to participate in the new school design to see what it revealed.
Design studio

*The Changing the Architecture of Educating*

Masters of Architecture design studio (fig 14) was developed with RMIT and Sandringham College, seen as mutually beneficial to both parties. The studio was run with Professor Martyn Hook and out of the three Sandringham campuses, the senior campus was chosen for the architecture studio, as it was the most architecturally challenging of the three sites, with a fragmented campus plan and architecturally diverse existing buildings.

The studio drew on exemplar case studies I’d researched through the PhD, such as the Reggio Emilia schools, Melbourne Grammar School and Preshil and responded to shifts occurring in Victorian school design. The additions and alterations design strategy was developed in response to recent changes in DET school funding, from rebuilding the most rundown schools, to providing maintenance and small works funding.

fig 10: Design Studio Workshop between RMIT architecture students and Sandringham College students and staff. Group 1 using drawings to prompt discussion.

fig 11: Design Studio Workshop, Group 2 using drawings and models to facilitate discussion.

fig 12: Design Studio Workshop, Group 3 using drawings and models to facilitate discussion.

fig 13: Design Studio Workshop, Group 4 using drawings and post-it notes to record impromptu comments.
School community
Sandringham College welcomed the idea of working with the RMIT students. We ran a design briefing session with the teachers and Sandringham students early in the semester, so the architecture students could experience a collaborative design process in developing an architectural brief. The architecture students prepared models of a portion of the campus as a basis for discussion with the school (fig 10-13).

For the architecture students, the main focus was to develop a deeper understanding of the needs of the school community and build on this to establish a new school identity.

The Sandringham students benefitted from working with the architecture students, with many of the Sandringham students selected to participate due to their interest in design. This was invaluable vocational experience for the school students, witnessing what it would be like to study architecture and the design process. Sandringham College gained a new appreciation for the strengths of their existing campus through the eyes of the architecture students and learning about the architectural value of existing buildings, seeing their campus from a new perspective.

Some of the key ideas to come out of the briefing session were that the Sandringham senior students had a strong association with their subject specialties and spent a lot of time outside scheduled class in these areas. The specialty areas had very little social or informal learning spaces, made up mostly of traditional classrooms. Instead, the canteen and library in the centre of the campus acted as the main social and informal learning space in the school (fig 08-09). The canteen was a glorified shed, hot in summer, cold in winter and had poor acoustics. The library was a good size and provided comfortable and warm spaces. The school encouraged the use of the space as an informal study and semi-common room area, relaxing the traditional rules of a library, such as no food and talking so students could feel ownership over the space. After the workshop between the RMIT students and Sandringham students, the architecture students started to develop their projects based on their interpretation of the brief, with the rest of the discussion of the Master of Architecture Studio work around the work of the architecture students.
The observation and site analysis work completed by the students increased their understanding of modern teaching practices and how the space could support this. Direct observation assisted in filling in their knowledge gaps on pedagogy and assisted in creating an understanding of the school identity. Through reflection on these observations, the students selected a pedagogy for the school. As part of the brief for the studio, the students had to develop a position on the type of pedagogy they proposed to develop skills needed for life in the 21st century. The students took a range of approaches, such as importing a pedagogy from another school that they thought would enhance learning at Sandringham, or strengthening existing pedagogical practices through space that facilitated and supported the activities.

Pedagogy

The challenge for the architecture students in the design studio was to develop an understanding of pedagogy and how it could evolve into architecture. To assist the students with this, the studio was underpinned by pedagogical engagement with school case study precedents from my PhD research. Melbourne Grammar School provided precedence for additions and alterations; Preshil for pedagogy and its relationship with architecture; and the school design approach used by Mary Featherston Design at Dandenong High School, which used learning settings to organise space (fig 15-17).

Featherston was a contributor to the studio and ran a lecture and workshop with the architecture students, providing invaluable knowledge and guidance on developing a brief with the school community and how it can inform design. We also focused on the design approach used by the Reggio Emilia schools in Italy (fig 18), viewing architecture as the third teacher, and created a sophisticated relationship between the school’s vision, pedagogical approach and how it evolved into architecture. These precedents acted as a guide for the students.
Architecture

The studio encouraged observation of the school community’s use of the site and the pedagogical practices in teaching and its relationship with space. For the architecture students, the observation work revealed which parts of the site were currently used by the school students, and areas that were under-utilised. This started to guide the architecture students on the types of spaces the school students were attracted to and how neglected areas could be redesigned. Likewise, the observations in the teaching spaces allowed the architecture students to draw associations between the pedagogical activities and the spatial arrangements to inform their own designs.

The architecture students worked in groups to develop a new masterplan for a portion of the school, with most projects then developed individually at a larger scale. Many of the student projects included ideas on how to build a stronger sense of community in the existing campus masterplan through the architecture and landscape design and addressed the deficiencies in useable outdoor space within the fragmented existing campus.

Gestures included the creation of outdoor community hubs, providing central social and informal learning opportunities and removal of buildings and barriers to open up connections and circulation routes between spaces across the campus. This idea flowed down to a smaller scale through the development of a new sense of community within the school subject domains such as science, art or specialty buildings, extensions to the library, through the inclusion of new outdoor learning and social spaces.
These approaches strengthened existing school cultures with the Sandringham VCE students having a strong association with its specialty programs. Within this, the architecture projects looked at the creation of a new identity through the design or visual links with the subject domains, such as in the science area with the use of the nucleus symbol to inform the shape of the new architecture and strengthen the building’s scientific identity.

The student projects drew on pedagogical precedents, such as Mary Featherstons ‘learning settings’ used in Dandenong High School and designing space to facilitate the learning interactions between teacher and students. Others looked at the learning spaces in the RMIT SAB building by Lyons for inspiration on types of pedagogical encounters. A fluid relationship between the pedagogy and architecture was encouraged and the blurring of boundaries between inside and outside space to provide a wide variety of social, structured and informal learning opportunities.

From the workshops sessions with the school, the architecture students came up with a vast array of different interpretations of what the school needed and appropriate architectural responses. An objective of the studio for the architecture students was to develop their design proposition for Sandringham College through additions and alterations to the existing school buildings. Strategies were developed for how to treat the existing buildings, whether to strip away parts of the building for new additions or remove parts to allow the insertion of new forms.

Through these gestures there was also an interest in creating new connections between the internal and external spaces, to provide a broad range of learning, social and informal learning space (fig 19-20).

Many of the projects explored ideas surrounding flexibility in the short term to accommodate different learning activities and in the long term to be able to accommodate many different pedagogies over the building lifespan. Approaches included the use of mobile learning pods to provide storage for educational resources and variation to the division of the open plan space, giving students the opportunity to adjust their learning space to support their daily educational activities or transform the building to accommodate different programs, such as exhibitions or performances. Similarly, adjustable joinery and loose furniture provided another layer of learning options.

The student projects highlighted the potential of creative approaches to additions and alterations of the existing school buildings, which brought new life into buildings that would normally be condemned spaces in a new school masterplan, showing the value of the existing spaces.
Design studio reflection

The design studio increased my understanding of school community and the role of school identity and how it manifests itself in architecture. The architecture student projects showed the value of a clear design intent and the symbolic relationships that can be drawn through school identity and architecture to increase a sense of community. The students found the workshop with Sandringham College challenging, experiencing first-hand communication gaps between architects and educators. They learnt about the vast range of information that a client will volunteer and the architect’s role to sift through the feedback and focus on the key ideas that can most effectively inform the architecture.

The architecture student projects provided a clear example of the capacity of architecture to respond to a school identity and the value of a clear design intent to purposefully pursue the design of a school. The Sandringham College school principal attended the end of semester presentations and was impressed with the students’ creative responses and capacity to create a new school vision linked to a pedagogy and represented through architecture.

The studio used architecture precedents, observation, site analysis and engagement with the school community as tools to assist with design. This work helped to inform the development of the school design tools.

fig 19: Existing canteen acts as informal social hub of school with library and was a focus of student design projects.

fig 20: Existing library used as social, informal learning and private study space and was focus of student design projects.
The Facades Project

School community

The Facades Project was completed with Sandringham College concurrently with the design studio. The school anticipated receiving $6m towards school architecture, which needed to have an impact across all three campuses. At this stage, the school was just beginning to think about school identity and how this funding provided the opportunity to improve the public image of the school. Several years earlier, the school had completed the masterplan process, with no follow through in government funding. With this past disappointment, some members of the school community were sceptical that there would be any real change and hesitant to be involved in the process. The first stage of the design process involved organising and uniting the school community, so they could work together to brief us for the school design and move forward from past disappointments of designs not proceeding.

The Facades Project was developed in collaboration with my PhD supervisor, Professor Martyn Hook, from his association with the president of the school council. The school funding could be spent at the discretion of the school and didn’t need to follow the formal DET school procurement process. The school had already completed extensive consultation with the school community on the perceptions of the school by parents and they were keen to do something quickly, which would have immediate impact in creating a new school identity. Parents had raised concerns about the nature of the existing simple and modest school fencing and the image it created of the school. They were also disillusioned by the rundown appearance of many of the buildings with prominent visual interaction with the broader community. The school was interested in addressing these types of issues through design, which focused on the public interface of the school with the community, such as fences, gates, landscaping and facades, through simple gestures in response to the small project budget.

The briefing process involved consultation sessions with principals and representatives from all three campuses, who came together to discuss and agree upon a shared project vision. This was followed up with sessions at each campus, to discuss the specific design considerations and concerns of each school campus. The outcome was a shared goal of rejuvenating the public image of the campus and establishing a new school identity that also responded to its surrounding urban context. The school was interested in a visible school identity that could be recognised across the three campuses, but for each to also have an individual identity within this.
The Bluff Rd Years 7-10 campus (fig 21-22) is on a compact site, with street frontage on three sides. The school wanted to create a new main entrance and relocate the administration area to the front of the school to engage with the community and create a visual presence along Bluff Rd, creating a new public image for the school. Within the campus, there was a lack of useable informal outdoor space, with the existing buildings dividing the site and restricting circulation across the campus. Visitor access and orientation on the site was also difficult, with the carpark located at the back and the visitor administration area hidden in the middle of the school, with visitors having to navigate through buildings to find it.

The Beaumaris Years 7-10 campus (fig 23-24) is located on a corner site, with the school orientated to provide north and south light to the teaching spaces, resulting in the buildings sitting at an awkward diagonal across the site. The campus had a vegetation overlay, with a substantial amount of established planting, creating a park-like setting for the school. There was an emphasis on sport, with community sports facilities located adjacent to the school. The Beaumaris campus had a more complicated relationship with the community, with uncertainty over the campus’ future resulting in a recent drop in student enrolment. This uncertainty led to creative solutions on the part of the school, who were exploring long-term plans of partnerships with public sporting organisations and shared use of new campus facilities. However, the school still wished to make some improvements on the campus for the immediate benefit of the students.
The Bluff Rd and Beaumaris Years 7-10 campuses are the main feeders of students for the Holloway Rd senior Years 11–12 campus. The senior campus (fig 25-28) had a street presence on only one front. However, existing fences and building orientation largely closed the site off from the community. The school buildings were nestled in one half of the site, however, there was no sense of shared school community space, with the two main open areas around the buildings serving as staff carparks. However the school was keen to relocate parking and create community outdoor spaces on the site. The library and school canteen adjacent to this area served as informal gathering spaces for the students. The school wanted to encourage greater public use of the school auditorium and wanted to design a new public entry to these spaces.

All three campuses shared the same overall goals of improving both the sense of community within the school through regenerating outdoor spaces and the school's public image to the broader community. These became clear agendas that were explored in the development of the Facades Project masterplan.

**Pedagogy**

The idea of a shared school and individual campus identity flowed on to inform the pedagogy. The Bluff Rd campus has a strong science program, and wanted to focus some of the new spaces towards this and additions to existing spaces, such as the Library and Gym, with spaces for modern pedagogies to expand the teaching program. The Beaumaris campus was interested in creating a sports academy for students to utilise and specialise in sports education as well as an interest in using this campus for a specialised Year 9 program. This stage of schooling can be a period when students become unmotivated and disengaged from their studies. The school was interested in providing an alternative Year 9 curriculum that mixed community engagement and outdoor activities with traditional curriculum to re-engage students. Year 9 students from Bluff Rd would also attend the Beaumaris campus for the year.
The senior campus for Years 11-12 focused on supporting students in their studies and identity development as independent individuals ready for their next pathway in life. The speciality subject domains were spread across the campus and students associated themselves with the subject areas they were studying. These buildings provided specialised areas for particular subjects. Shared gathering spaces, where students studying different subject areas could socialise and meet between classes, was lacking across the campus.

A shared aspiration across the school was to provide new education spaces that shifted away from the traditional, general purpose classrooms that dominated each campus. The school was interested in new pedagogies and saw the architecture as a facilitator of this.
Architecture

During this time, there were changes in the government funding model for schools, with funding shifting away from rebuilding the most rundown schools, to maintenance funding to upgrade existing education buildings to a minimum standard. Sandringham had a broad range of aspirations across the three campuses. With a limited budget, and uncertainty whether further funding would come through, the school wanted to improve all three campuses. As architects, we decided to look at the adaptive reuse of the existing buildings. The architecture interventions were strategically focused around creating a new school identity for each campus, regenerating outdoor spaces to create a sense of community, and inhabitable facades that could accommodate new pedagogies.

As precedents for the project we were interested in design processes that involved the school in the project, assisting in uniting the school community through their participation in the design, also contributing to their sense of ownership and belonging when they inhabit the new architecture. We looked at the work of German architect Susanne Hofmann and her group Die Baupiloten BDA at the Lichtenbergweg Kindergarten (fig 29) in Leipzig, where she involved the children in the design through their participation in consultation and games designed to obtain feedback on the children’s ideas for the space and atmospheric qualities of their school. The final design was influenced by stories the children were interested in, informing the use of colour and materials to evoke the qualities the children described from their stories.

In our approach to the design of this project, we saw the landscape and public spaces as just as important as the architecture in the creation of learning environments. The educational benefits of outdoor learning environments and their capacity to provide learning opportunities unavailable in the classroom is described by Dyment (2005, p. 30) in her paper, ‘Green School Grounds as Sites for Outdoor Learning: Barriers and Opportunities’. When the context for learning changes from an indoor, book-centred environment to an outdoors and nature-centred environment, students find it to be a more meaningful context for education. Learning easily comes alive, as students are able to handle, touch, smell and even taste the materials they are learning with and from. Outdoor learning on green school grounds can help to motivate and inspire students who do not learn best in classroom.

Through recognition that the design of the outdoor learning environment added another layer of complexity, we looked to collaborate with landscape architect Dr Anton James from JMD Design in the development of the project. James is also an accomplished artist and produces public art commissions. He has a combination of interests and site-specific approach to design, which blurs the boundaries between art, landscape and architecture, tying in with key aspirations for new outdoor learning spaces and a renewed public image of the school through the Facades Projects.
For the architecture and landscape we also looked at Melbourne project precedents, such as the Sunshine Secondary College by Spowers Architects with Stutterheim Anderson Landscape Architecture (fig 30-31). Similar to Sandringham, this project proposed the reworking of an existing campus masterplan through simple gestures for the architecture and landscape. The demolition of an existing school wing in the middle of the campus opened up the school site, with the strategic insertion of the new architecture into this space, creating a strong dialogue between the new and existing architecture within the central open space.

The Facades Project at Bluff Rd campus (fig 32) focused around the main entrance and public interface with Bluff Rd. The rejuvenated landscape provided usable informal learning and outdoor spaces and a place where the school community could gather. A new front fence curved around the corner to create a shared civic space for the public and school, creating a sense of presence and point of interface with the broader community. The inhabitable facade joined the four separate buildings, creating a new public face for the school, and covered outdoor areas connected the four buildings and provided
fig 32: Facades Project Bluff Rd campus, in collaboration with Professor Martyn Hook.

fig 33: Facades Project Senior campus, in collaboration with Professor Martyn Hook.
informal learning areas for the students. The spaces in the new facade extended the arts wing and library through new teaching spaces. It also created a public entrance and teaching space for the gym and a centrally located administration area. Visitor access to the site was improved through locating a small carpark beside the gym, with clear wayfinding to administration. The inhabitable facade translated the new school identity into physical form, through drawing from the materiality of the beachside location with modern lightweight construction materials.

The Facades Project at Beaumaris (fig 34) had a similar strategy of rejuvenating the main public access point to the school through landscaped community areas. A screen was designed to be positioned at the main entrance across the end facade as signpost for the school. A canopy marked the visitor administration area and provided a new front to the other visible wing. The interventions on this site were on a smaller scale, but like the other campuses created a new public image for the school through modern and local contextual materials.

The Facades Project at Holloway Rd (fig 33) focused around three main areas on the campus. Landscaping works created a main visitor entry for the school that was separate to the primary school. In the middle of the school, the relocation of the staff carpark allowed the creation of a large outdoor area to provide a central school community gathering point and informal learning spaces. This space became connected with the street through the removal of the existing perimeter wall to create a main student entry and opened the school to the community. With this central space as the new focal point of the school, inhabitable facades were designed to the surrounding buildings. The canteen already served as a social hub for the students, but the building amenity was poor. The canteen was relocated from the back of the campus to connect with the central open space. An extension to the library was also planned.
to provide informal learning areas as a transition zone and differentiated from the existing traditional library space. For the gym, a new foyer was created to provide teaching space for new pedagogies and an exhibition and foyer area. A student centre was planned at the student entry as a new contact and support point for student activities. Similar to the Bluff Rd campus, a new carpark and bus zone was planned to rejuvenate the dead space beside the gym. A new foyer and dance studios extended the existing performance areas to increase its capacity as a shared school and community facility.

The three Facades Projects aimed to create a sense of community within the existing campuses and improve the school’s public interface with the community. We were interested in how the school identity could translate into physical form and the adaptive reuse of buildings to accommodate new pedagogies. However, changes in the funding allocation to the school meant that the projects didn’t proceed beyond the masterplan stage, as new DET directions came into play.

**Facades Project reflection**

Through reflecting on these projects I became aware of the challenge for the school in uniting the school community and creating a shared project vision and school identity, which was underdeveloped and just starting to emerge when we began designing. This highlighted the need for the school to do some work on these issues before engaging an architect. The school also hadn’t thought through how its vision and values might inform new directions for the pedagogy. This became challenging for us as architects to create symbolic connections between the developing vision and values and the architectural form. This project increased my understanding of the school community and the types of issues that need to be worked through as part of the design process.

‘Achievement, creativity, independence, integrity, respect’
(Sandringham College values 2013)

‘Sandringham College provides an environment in which diversity, depth and quality of curriculum enables our students to become resourceful independent learners’
(Sandringham College vision 2013)
School design adviser

After the development of the Facades Project masterplan, the DET announced an intention to invest significantly more funding into Sandringham College and the re-engagement of the architects Clarke Hopkins Clarke, who had designed the school masterplan several years earlier, to design three brand new school campuses. Given significant work had already been done with the school, Hook and I proposed that the school engage me as a separate consultant on the development of the new masterplans. This provided continuity across the projects and ensured work already developed could continue to inform the new school designs.

For the school, there were further advantages in this arrangement as identified in the Reflective Practice and School Procurement chapter. The comparative analysis diagrams, had identified gaps in the briefing process, connecting the school’s pedagogy with the architecture. These observations evolved into the three key relationship diagram, which identified a key role of the architect to evolve the pedagogy into architecture. My past school projects and case studies had also recognised the challenge in doing this. On my school projects in Bendigo, the DET had appointed FNI to bridge the gap between pedagogy and architecture. Likewise on Dandenong High School, Hayball brought in Mary Featherston to develop learning settings to connect the pedagogy and architecture. Reflection on this allowed me to identify that working with the school community to link pedagogy and architecture in the design process could be part of my role as an architect, which led to the creation of the school design adviser role.

School community

In working with Sandringham College and the architects, I was consistently looking for gaps in the design process as points of intervention to assist the school. There was a general need to provide the school with information and support on the design process used by the DET. Most of the school leaders hadn’t been involved in a new school design before and I could assist in educating the school about the stages and their role within this. Through this, I highlighted the information that the school community needed to provide to the architect and the decisions they needed to make.

School identity formed part of this and Sandringham started revising their logo, vision and values (fig 35) as a school community during the design of the masterplans. The school worked with staff, students and parents to regenerate their school identity. The school community recognised its strength in providing a unique educational niche in the region and revised its vision and values to communicate this. The logo, vision and values show the school’s intentions with the students and reflect their assumptions and beliefs for the students post-secondary school. They provide a mission for the attributes they’re aiming to develop in their graduates and benchmarks for the students to aim for. The work Hook and I had done in the preceding few months with the design studio and Facades Project, assisted the school staff to unite together more effectively to articulate the school identity. They were able to create a vision shared by all three campuses and differentiate the identities of each campus to meet the specific needs of the Beaumaris and Sandringham communities.
However, the school needed assistance with how these ideas could inform the masterplans and how to communicate these ideas to the architects. To assist, I held workshops with the school leaders and started diagramming the key relationships they wanted to facilitate on each site. The architects Clarke Hopkins Clarke architects had prepared draft masterplan drawings, and we used this as a basis for discussion, reflecting on the key design moves and whether they supported the school community objectives.

For Bluff Rd, the school wanted to develop partnerships with the community and positioned shared-use facilities towards the school boundaries for easy access, such as sports facilities, library and performance spaces, with the school facilities located towards the centre of the campus. Shared-use facilities could be used to build relationships with the community and provide additional revenue through the hiring of school-owned spaces. Through my diagrams we grouped potential shared-use facilities together and linked them with carparking and site circulation for easy access (fig 36-37). The school retained some of the masterplan moves developed in the Facades Project, such as the relocation of the main entry of the school to the Bluff Rd and Lawson Parade corner, with the creation of a public plaza and a prominent visual presence along Bluff Rd. They wanted to have a shared central school space, to create a sense of community within the site, with the surrounding buildings shaping the area. Through the diagrams we setup key relationships that the school wanted to facilitate with the surrounding urban context and existing facilities that were being retained (fig 38).

Beaumaris campus shared some of the key ideas, but was differentiated through a greater emphasis on sport and recreation. The sports and community centre was located to facilitate shared use and positioned near the main road (fig 39). Site relationships from the Facades Project masterplan were carried through and we relocated the proposed public plaza away from the busy Balcombe Rd and Reserve Rd intersection for better integration with the surrounding urban context. In a similar manner to Bluff Rd, the buildings were arranged around a central space to create a sense of community on the site.
The senior campus was the more complex of the three sites and again the Facades Project informed the new designs and creation of a school use area and community use area. Like the other two sites, the school use buildings were located around a central courtyard to create a sense of community within the school (fig 40-42). The potential shared-use facilities, such as performance, sport and recreation spaces, were grouped with public carparking for easy community access. The three access points from the Facades Project masterplan were also retained, with visitor access to administration, student access in the centre of the site and public access to the performance and recreation areas.
Through the workshops with the school, I diagrammed the ideas discussed to brief the architects. Many options were drawn with the school and the school staff engaged with the process through drawing their own versions of the diagrams. This showed that this form of communicating with the school was effective and enabled the school staff to more actively participate in the design process (fig 43-44). The agreed upon final school design relationship diagrams were drawn to clearly communicate the school’s design intentions for easy collaboration with the architects. Through the school design adviser role, I was able to listen to the vision and values of the school community and evolve the ideas into a masterplan diagram. Through evolving the school community ideas into an architectural format, that was easily understood by the architects, we avoided communication gaps between the educators and architects and the ideas could be easily incorporated into the final masterplan.

The biggest challenge with this role was the short timeframe of the masterplan. I had been appointed halfway through the masterplan process and only had six weeks to review the architect’s drawings and work with the school to test if they supported the vision and values of the school community before the architects had to submit their final masterplan to DET for approval. The other constraint was the development of the school’s vision and values, which ran concurrently with the masterplans. This left little time for a deeper reflection on how the school’s identity, vision and values could be expressed through the architecture and we instead focused on broad brush ideas and agendas.

**Pedagogy**

Ideally, the identity of the school is reflected in its practice and approach to pedagogy. The speed of the masterplan development placed limitations on the depth of the connections between the school identity and how it informed the pedagogy. In case study Dandong High School, the school developed its pedagogy from the school’s vision and values. Similarly, when I visited the Reggio Emilia schools in Italy, I saw how the pedagogy evolved out of its values as a community. The Reggio Emilia schools suggest that its pedagogy is not transferrable to other places and instead encourages visitors to the schools to understand the concepts behind the school’s development, so they could evolve their own pedagogy in response to the particular needs of their own school communities. At Sandringham, with the lack of time to evolve a pedagogy specifically for the Sandringham community, through visiting precedents, the school found a pedagogy in use at another school that they thought would be suitable for Sandringham.

As part of the school design adviser role, I worked with one of the school principals to assist in how the education brief they were writing for the DET and architects, could start to inform the architecture. Like the school identity, this was being developed at the same time as the masterplanning process. The school had chosen the 3i’s pedagogy, which focused around three key modes of learning. This included instructional learning, essentially describing traditional teacher-directed instruction; interdependent learning, for student collaboration and learning from peers; and independent learning for students to work individually. In the DET Principles of Learning and Teaching P-12 Unpacked, they describe...
that independence and interdependence are modes of learning that should be promoted in the learning environment to promote autonomous learners (DET 2016, sect. 2).

As part of the objectives in the DET template for the education brief, there was a larger set of education agendas that the school had to frame their approach to teaching within. The school found the writing of the education brief useful for clarifying the education objectives of its school community however I felt some areas of information were absent. The school wrote the education brief, but there was little time to really tailor it to what they saw as the unique educational opportunities they were aspiring to in their vision and values, with some of the briefing information reading as fairly generic and applicable to most schools. The document was written using education terminology, with only a small section on how this might inform space. As a communication device to brief architects, the education language needed to be interpreted by the architects and evolved into architecture. This process relies on the skill of the architect to draw relationships between pedagogical aspirations and the type of spaces that could facilitate them. The deficiencies in the education brief reinforced the need for the school design adviser role to bridge the gap between the educators and architects.

fig 39: Beaumaris final relationship diagram for CHC.
To assist the school in understanding how the education ideas they were writing may inform architecture, I showed the school precedent projects that used different types of pedagogy and drew associations for them in how this informed the masterplan moves. Through this process, I prioritised for the school the decisions that were important for them to decide during masterplanning and what could be worked through in the following project stages. For pedagogy at the masterplan stage, it was important for the school to decide the key pedagogical relationships they wanted to facilitate on the site.

The Bluff Rd campus is centred around a central plaza to promote school community, providing spaces for different stages of learning. This is done through the linking of year levels across the site with specialist spaces. The Years 7 and 8 home base spaces are connected with the science program, as these students are involved in the Sandringham Science Academy as core subjects. The Year 9 home base is connected with art and technology specialist spaces. Initially, it was desired to have Year 10 connected with the library and careers space to promote learning. Through discussions with CHC, this evolved with the final masterplan linking Years 9 and 10 to provide a greater range of teaching spaces for the 3i's in this building. There is a sports precinct created to accommodate the school’s sports academy, with links to canteen and food technology for good nutrition. The existing hall will be renovated to provide for the music and drama program with a new street presence. The library and admin building will provide a strong visual icon to promote learning for the school.

The spatial connections from Bluff Rd have been carried through to the Beaumaris Campus, with the exception of the addition of a proposed privately funded community centre. The established existing vegetation of the site has been considered to create a connection between the architecture and nature through the placement of the buildings.

The students at the senior campus have different requirements, with Years 11 and 12 spread across all buildings. With the need to provide spaces for specialist VCE subjects, the domains have been grouped across the buildings to allow collaboration between domains. These domains also give the
students a home base, with each student associated with a particular domain for the VCE program. The buildings are grouped around a central plaza to promote school community, with the school canteen linked to this space. The buildings adjacent to the sports fields connect to an active courtyard to strengthen connections between these buildings and the sports fields, encouraging physical activity. The existing administration building, as public face for the school, is linked with the IT and business programs. Technology and art are linked with outdoor teaching spaces and technology partially separated to assist with acoustic issues. The resource centre occupies a central position to the main courtyard and connects with the maths/science domain. The existing library, multipurpose hall and auditorium buildings have been linked with additional spaces to provide connections between these programs. With the relocation of the library, this building will be adapted to provide for the music and drama program. Food technology is linked to the PE spaces to promote good nutrition. It’s also near the outdoor amphitheatre and performance space to potentially provide catering for these spaces. The new foyer will provide a new public entry to this building, promoting the school and allowing greater community use of this facility. The preferred relationship diagrams were discussed with CHC, with some final changes made for incorporation into the masterplan.
Architecture

In my comparative analysis diagrams I discussed the impact of tight deadlines on the architect’s role and with slow briefing feedback or absence of information, architects need to make decisions for the school and finish the design on schedule. The school design adviser role is able to help with this issue through assisting the school in developing its brief. The school relationship diagrams assisted in facilitating communication between the school and architects through interpreting the intentions of the school into the visual language of master plan diagrams for the architects.

The creation of a DET master plan is a long-term proposition. In the master plan, it is critical that the school setup the key relationships they want to facilitate on the site. With DET masterplans, once approved, there is little scope for major changes to the masterplan design, as it informs the building of the project through staging and size of future funding allocations. Thus, if schools do not get the key relationships right upfront, they can be locked into those decisions for the long term. As part of the school relationship diagrams, we focused on incorporating key ideas surrounding the school’s relationship with the broader community and generating a sense of community within the school, the pedagogical relationships and subject domains to brief the architects. The relationship diagrams gave the architects an additional layer of information to design the architecture on site.

For Sandringham, a masterplan was completed for each of its three campuses. However, beyond the initial $6m for the first building, there was no known timeframe for further funding commitments. For a school, the completion of a masterplan can take many years, or not occur at all, as was the case with the first Sandringham masterplan.

School design adviser reflection

For the Sandringham school community, the lack of advanced notice for the school to start preparing for the development of its new masterplans created challenges in the school design process. However in the school design adviser role I was able to assist the school in prioritising key decisions to be made during the masterplans, assisting in making the most out of the time available. The use of the masterplan relationship diagrams drawn with the school were effective in communicating key ideas back to the architects in a timely manner. My experience with Sandringham College highlighted the need for a prebrief process, prior to work commencing on architectural drawings for the school, to develop both the school identity and pedagogy, so that it can be influential on the architecture. This occurs in other countries, such as in Canada, where schools are given one to three years notice before design commences, to not only begin planning within the school, but to develop relationships with community and partner organisations to plan the school as a valuable resource for the whole community.
fig 43: Senior campus relationship diagram by school staff member.

fig 44: Senior campus relationship diagram by school staff member.
Reflection
The projects with Sandringham College gave me a deeper understanding of how a school community operates and provided opportunities to work with a school community in a different capacity to my past practice projects. The Design Studio and Facades Project revealed the importance of school identity and how it can inform and be expressed through architecture. The emergence of the school design role increased my understanding of how the school community develops its school identity and experience the challenges and issues that arise as part of this process. Through this research I’ve repositioned my objectives for the school community pole (fig 45).

This summarises my new understanding of the school community pole and its relationship with the pedagogy and architecture poles. In the three key relationship diagram, the red phrases summarise each point.

Aspirations for the independent role of the school community pole:
• Engage in pre-brief development of the school community aspirations.
• Develop the school and community relationship.
• Develop the role of the school within the community.
• Identify members of the school community and their needs.
• Explore opportunities for shared use facilities between the school and community and develop strategies for their management.
• Articulate the school identity and culture.

Aspirations for the dependent relationship between the school community and pedagogy pole:
• School identity to be reflected in the development of the pedagogy.
• The school community values to be expressed through the pedagogy.
• Develop intentions for the attributes of graduates from the school.

Aspirations for the development of the brief through collaboration of the three poles:
• Create a planned brief development.
• Develop a clear design intent to inform the architecture.

The observations made for the architecture and pedagogy poles, describing the need for leadership by the architect to guide the school community through the design process, facilitating the development of their school identity and bridging gaps between the pedagogy and architecture, was emphasised further through my experience with Sandringham College. These projects assisted in framing the school design tools and how they could be used by the architect to work with the school community to build the three key relationships between the poles, and in particular the importance of the school community pole within this.
fig 45: New three key relationship diagram with evolved school community pole, November 2016.
References


4.1 School Design Tools

The school design tools have emerged in response to the research on the relationship between the poles of architecture, pedagogy and school community. The tools recognise that creating a school is not just about designing architecture, but the building of the relationships between the three poles, providing strategies and approaches for the architect in the school design process. The tools have been developed through reflection on my past practice projects and projects with the school community at Sandringham College. Research into the methods and approaches used by other designers to develop a brief and the architecture has expanded my understanding of participation processes and their use during school design. There is a need for more defined ways of engaging in participation processes between the three poles in the development of the architecture.
fig 02: Three key relationship diagram, November 2016
Introduction

The three key relationship diagram (fig 02) brings together the findings from the research into the three poles in the Architecture, Pedagogy and School Community chapters. This research revealed the complexities, knowledge gaps and challenges in the building of the relationships between the three poles during the design process.

Reflecting on this body of work, I recognised the shortcomings of brief and design development methods I’d used in past practice projects and that I needed to develop a new approach, which was not only about designing architecture, but the building of the relationships between the three poles during the design process.

This became the driver for the PhD research – to develop new strategies and multiple approaches to the complex and recurring issues that I’d identified through the research and my experience in past practice projects. This led to the concept of the school design tools – a suite of practical tools that would assist the architect in the school design process.

The school design tools are designed to reveal a deeper understanding of the pedagogy and school community poles, and how they can inform the development of the architecture pole. The tools need to be broad enough to be adaptable to different contexts, but also have the ability to reveal very specific information particular to each school community.

The development of the school design tools became a way to speculate on new methods of working for the architect. They are about designing architecture and importantly, developing and building collaboration between the three key relationships of architecture, pedagogy and school community, aspiring to create more effective school architecture.

School design tool precedents

In the early 2000s, the Victorian government became interested in new approaches to school design to accommodate modern pedagogies. However, while there are some Victorian government standards and guidelines for architects working on schools, as discussed in the Reflective Practice and School Procurement chapter, the design parameters are broad. There is a lot of scope for architects to adapt and interpret the constraints and to push new design directions for schools. This has led to diverse design responses tailored to the particular requirements of each school community, as well as experimentation on the best way of designing to facilitate modern pedagogies. This is recognised in the three key relationship diagram, which emphasises the important role architects play in the school design process, influencing the design direction and outcomes of the architecture.
Conflict between procurement methods and time for consultation with school

For architects working on school projects, there is an uncomfortable relationship between the traditional project procurement methods used and the need for the architect to work beyond this, engaging in participation methods with the school to tailor the design to the needs of each school community. This conflict between the procurement method and time required for consultation with the school, impacts on the development of the brief and architectural outcome.

In US architect James Butz’s paper ‘Educator and Architect Partnerships for Success’, he comments: ‘To facilities managers and architects, the traditional project delivery process is fundamentally sound and well understood, but it is not ideal for the challenges faced today. In today’s education environment, the planning process should be more collaborative with educators, because educators are on the front lines of attempting to focus on student learning’ (Butz 2002, p. 57). He also points out that architects on school projects are often only engaged once funding is in place, limiting the amount of time available for pre-design conversations and relationship building between collaborators. The short programs limit time in design stages, where critical decisions are made to shape the project (Butz 2002).

Process precedents

Reflecting on these issues prompted me to question the participation methods I’d used in the development of past project briefs and how this had informed the architecture. In my past practice projects, school workshops focused on answering broad questions, with the discussion fairly unstructured beyond that. For example, in the Bendigo Regeneration Project, the teachers from science and art subject areas were invited to discuss design requirements for multipurpose art and science rooms. As architects, we asked questions and the teachers provided feedback that they thought might be useful. I collected a range of information and curated it in the development of the architecture brief, discarding the rest. This process relies on the knowledge of the architect and the practice’s capacity to envision whether or not the information can inform the architecture, which is subjective and therefore inadequate.

This prompted me to look at how other practices were engaging clients, which revealed a broader range of ways to invite clients to participate in the design process, and the differences in the types of information obtained via various methods. I also looked outside the architecture profession for insight, where I found a variety of types of engagement in participation methods that could be more specific and tailored to understanding clients’ needs.
Position on participation

Participation processes are grounded in theory. Jeremy Till discusses an example in *Architecture and Participation*: ‘… architectural participation can be seen as a means to get the presumed support of the citizen user for actions that have already been determined by professional agents’ (Blundell Jones, Petrescu & Till 2013, p. 26). Till goes on to suggest different ways of engaging in participation methods that empower the participant and reduce the architect’s role or power as master decision-maker, as a means to creating a greater sense of equality, prioritising the participation process itself over potential architectural outcomes (Blundell Jones, Petrescu & Till 2013). While these are noble sentiments to value the contribution made by participants and encourage its impact on the architectural outcome, diminishing the architect’s role may impinge on what can be an architect’s strength. To take participant feedback and evolve it into something not yet imagined. As discussed in the Pedagogy chapter, architecture can lead to pedagogical change and, through new physical environments, prompt user change. There needs to be a balance that values the strengths of the participant and the architect, recognising that they don’t need to perform the same role on the project.

Sherry Arnstein’s ‘Ladder of Citizen Participation’ first published in 1969 provokes critique of participation methods used by the US government in the 1960s to involve citizens in decision-making processes used for public projects (fig 03). Arnstein’s ladder ranges from ‘manipulation’ and ‘therapy’ as a form of non-participation at one end, to ‘partnership’, ‘delegated power’ and ‘citizen control’ at the other end, as methods for assisting citizen power. ‘Consultation’ sits with ‘informing’ and ‘placation’ in the middle, as a form of tokenism. This struck a chord with some of my past frustrations working in practice, with the types of consultation methods commonly used and their capacity to inform the architecture in meaningful ways.

Idealised views of participation can be difficult to achieve within the realities of architecture practice and traditional procurement methods, where the architect is ultimately professionally responsible and carries the risk. The participant doesn’t carry the same level of responsibility and can ‘choose’ how much they want to be involved. In practice, I found that with the unfiltered nature of participation, feedback from participants can range from the educated and well considered, through to opinion and even frustration and venting, arising from concerns over the impact of the forthcoming changes to how a new environment will alter how an individual performs their job. New school buildings that change the way teachers need to operate are met with scepticism from some, yet welcomed by others.

German architect and theorist, Markus Miessen, has written extensively on ‘participation’ with works such as *The Nightmare of Participation* (Miessen 2010). He encourages this diversity of feedback. ‘As a collaborator, you should always follow your own opportunistic agenda. You can always say no. Only when people with different agendas meet there is actually a productive outcome, which produces new
ideas or concepts. One has to set up professional frameworks and working mechanisms in order for this dynamic to eventually turn prolific (Miessen 2013, p. 4). He goes on to add: 'Collaboration can only work if there is something in it for everyone. But this does not mean that it needs to turn into uncritical and consensus-orientated cooperation' (Miessen 2013, p. 4). The architect can create the context for participation, but cannot control if people choose to engage in the process.

This raises questions around the role of the architect in the school design process, and is discussed in the PhD research of Dr Melanie Dodd ‘Between the Lived and the Built: Foregrounding the User in Design for the Public Realm’ (Dodd 2011). Dodd demonstrates an ‘expanded definition of architectural practice’ (Dodd 2011, p. 8) and describes different roles and personas used in her approach to participation and design. This shifts the role of the architect to more consciously facilitate the context for participation, where both the participant and architect benefit from the consultation encounters.

In past practice projects, I observed the pitfalls of the participation methods used. Crusoe Secondary College by HASSELL, for example, we discussed the design of the proposed open plan spaces with a group of teachers during sketch design, trying to understand how they would use the space. The teachers were anxious about the changes in teaching practices as they shifted from classrooms to open plan spaces, and viewed the new design in reference to how it was different to what they currently had. For the teachers, a drawback of the open plan was the loss of structure within the space and the reduction of available teaching walls and pin-up areas. The teachers argued that pivoting panels were necessary to give them the flexibility to divide the open plan space into classroom-type teaching areas and would provide the necessary wall space.

This issue is discussed by Sue Wilks, partner investigator in the ARC research project, Smart Green Schools: The Unofficial Overview. ‘Architects working with teachers have found that few can express ideal spaces using anything other than the spaces, furnishings and equipment they already have’ (SGS 2010, p. 14). I visited Crusoe Secondary College post-occupancy to see how the open plan spaces were being used, as well as the pivoting panels. The new school principal viewed the pivoting panels as a waste of money and asked why they had been installed, advising me that the teachers didn’t use them. In these situations, critique often falls back on the architect, rather than viewing the design outcome as reflective of the participation process that the school contributed to. When schools participate in the briefing process, they need to understand that there will be ‘real’ implications from their feedback, and accept a share in the responsibility for the outcome they shaped.

This suggests that architects need to be aware of the types of feedback they can realistically ask schools to provide in participation processes. Architects need to manage this process through a better understanding of teachers’ knowledge and the limitations of their ability to provide feedback on particular issues. This includes developing useful and meaningful ways of engaging with the school community so that teachers and principals can effectively contribute.
Precedents for school design tools
Fielding Nair International (FNI)

There are a range of consultants who assist with the design of schools in different ways. The approach to school design FNI used on the Bendigo Regeneration Project was underpinned by ideas developed in their book, *The Language of School Design: Design Patterns for 21st Century Schools* (Nair, Fielding & Lackney 2009). FNI advocate that there are a consistent set of broad issues in school design, for which they have designed a solution. The book outlines a series of 28 design patterns and ways of resolving them architecturally (fig 04). ‘Each pattern describes a problem that occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice’ (Nair, Fielding & Lackney, p. 14). The design patterns represent what FNI have assessed to be universal principles that are important in school design, independent of current education fads and curriculum changes.

In practice, working with FNI and the ideas conveyed in their book, revealed issues with this design approach. This was evident in the Bendigo Regeneration Project, where challenges arose with FNI trying to import US education ideas to an Australian context, without adapting them to the needs of each school. For the school community, the application of imposing a ready-made design onto the school led to conflict and resistance during the design process and the spaces being used differently to the design intent post-occupancy. The projects with FNI are discussed in more detail in the Reflective Practice and School Procurement, Architecture and Pedagogy chapters.
Mary Featherston Design

Mary Featherston Design specialises in learning environments and was involved in the Dandenong High School case study. Featherston’s research and design practice focuses on the relationship between contemporary pedagogy and the design of the physical environment. Featherston recognises the challenges in working through the briefing process with schools and has developed methodologies for doing this. In an interview for my PhD research, Featherston explained the challenge is in getting the schools to think outside what they already know and imagine better ways of doing things.

Featherston has worked on a number of projects, developing tools to assist in the school design process. She develops ‘learning settings’, which facilitate the building of relationships through learning and social interactions (fig 9). This informs the planning and can be seen in Dandenong High School and Wooranna Park Primary School, detailing the types of activities that need to be accommodated in each learning centre (fig 05-10).

Featherston’s sophisticated approach takes time and it requires the school to see the benefit in spending the time and resources in articulating its vision. In my own work, I’ve found that it can be challenging to obtain this level of feedback from the school within DET timeline restrictions and communication constraints between architects and educators. So there’s a need for an efficient way of obtaining the briefing information from the school within the short timeframes.
fig 09: Wooranna Park Primary School, 2005, Mary Featherston Design. (Source: Mary Featherston Design) Learning setting relationships between people for friendship, wellbeing and learning.

fig 10: Wooranna Park Primary School, 2005, Mary Featherston Design. (Source: Mary Featherston Design) Learning settings for Grade 2 Snapshot.
Alistair Blyth

Architect Alistair Blyth has worked at the Organisation for Economic Co-operation and Development (OECD) as an education policy analyst, and discusses the broader role design can play (fig 11). Blyth suggests: ‘Design as a process can play a greater role in the development of learning environments than merely to create the fabric of buildings and learning spaces’ (Blyth 2013, para. 1). In discussing a school project that he worked on, he describes: ‘The trick is to look at the interactions over time between people, as well as between people and their environment, including the physical, technological and pedagogical environment. We were exploring both the interaction themselves and we were trying to understand how to facilitate them in this context. Thus not only were we designing for interaction, but we were designing interactions themselves’ (Blyth 2013, para. 7).

Bridging the gaps

Blyth discusses the issue of communication between architects and educators. ‘Very often architects do not fully appreciate the nuances in the language of education and educators will not always be able to read architectural plans and drawings’ (PEN 2012, p. 4). He discusses the role of architects to facilitate the context of participation to enable good communication between architects and educators. He suggests that architects can ‘use the process of design to really uncover something that may have been implicit or may have been hidden in the subconsciousness of educators and actually surface them. What can happen is that you have a dialogue with the client, you begin to realise that the design solution isn’t quite what they originally assumed it would be, and that’s when you know the process is working’ (PEN 2012, p. 4).

Featherston also discusses this issue. ‘There are many impediments to the translation of schools from conventional instructional classrooms to convivial learning environments: a general lack of awareness of the role of the physical environment, lack of shared language between educators and design professions, (and) lack of appropriate design process involving all protagonists’ (Featherston 2005 p. 9).

Blyth and Featherston recognise and describe some of the challenges for architects and educators in working together, in particular the issue of communication between the architect and school community.
Education brief
As a strategy to assist in the articulation of the pedagogy to brief architects in designing schools, the school prepares an education rationale as a briefing tool. Education rationales may be written using a DET template and can contain a lot of generic aspiration statements on education that can be applied to virtually any school in Victoria. The issue with this document is that it primarily uses ‘words’ to communicate ideas from an educator’s perspective, using education terminology that describes a multitude of elements that don’t necessarily relate to ideas about pedagogy and how it relates to space. For the architect, the difficulties are encountered in understanding the difference between a teaching practice idea and an educational idea that could be represented spatially or transformed into architecture. Understanding the relationship between the architecture and pedagogy and how they interact and support each other is fundamental to the design process.

As an architect, I’m interested in developing ways of working with the school to drill down to the heart of the school’s identity and understand this on a deeper level. In this way, the architect’s ability to develop a useful and in-depth brief with the school is critical. It’s during this stage that there’s a need for a common language and a way of communicating ideas between the architect and school, so that the translation between education ideas and space can occur.

Architectural return brief
In the Reflective Practice and School Procurement chapter, I discuss the types of briefing documents I prepared as return briefs to the school for comment. My research on the communication challenges between the architect and educator questions the relevance of this type of return brief as a device to communicate details of the design to the school principal and teachers. The school staff’s ability to be able to interpret, understand and comment on that level of detail is questionable and the school doesn’t officially sign them off. Although this type of document is useful for the architect, its preparation takes a great deal of time. In context of low architectural fees for government school projects, I became interested in alternative devices that could be used to communicate and discuss the brief and design intent with the school, which would be easier for the school to engage with.
**School guide**

The Office of the Victorian Government Architect has also produced the *Good Design + Education* brochure (OVGA 2014), which aims to promote and raise awareness of good design principles and how these can contribute to successful learning outcomes in schools. This type of brochure can be given to a school principal or teachers to help them understand the relationship between pedagogy and architecture and facilitate their participation in the design process (fig 12).

**Engage, Envision, Enrich, Mayfield Project**

The Engage, Envision, Enrich, Mayfield Project is coordinated by the Learning Environments Australasia and the NSW 2014 team created a toolkit of contemporary learning environments, which aims to work as a common vocabulary (Mayfield 2014 NSW Team 2014a, 2014b). The toolkit is in a brochure and interactive, web-based format, with the intention that it could be used by architects and educators to discuss education concepts and how they could be facilitated through space (fig 13). Alistair Blyth is one of the mentors to the teachers and architects who developed it. This type of communication device is an effective tool to use in discussion with teachers and principals when developing architectural concepts for a new school.

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Teamwork and Collaboration are important aspects of 21st Century Learning. Learning is a social act. It is through thinking, interaction and co-operation with others that our capacity for learning increases and develops. This is why genuine collaboration forms a crucial aspect of 21C learning. Small group collaboration gives students the opportunity to use the spoken, written, visual and embodied language that many children don’t come to school with, but need to learn to participate at school.

Small group collaboration facilitates this ‘school language’ because it increases language input to children. They not only hear more language, but a greater variety of language is directed toward them. Words are repeated, ideas are rephrased, problems are restated and meanings are refined. It also increases language output. Children are compelled to produce more language in real time when interacting with more speakers, not just a teacher. Conversational turns must be managed, what they say must make sense and they must genuinely seek new information in a realistic context. In a classroom of 25 students this means a degree of visual and acoustic privacy becomes important.

Considered designs should address the needs of different sensory learners (kinaesthetic, auditory, visual). Effective designs should be conducive for learners of varying ability levels to work, learn and grow together.

How can I encourage collaboration in my learning space?

**Adaptable Furniture**

Furniture that can adapt throughout the day for a variety of scenarios and activities is beneficial. It is also important to consider furniture that may be more informal and adjustable for breakout areas and group work.

Light, adjustable, mobile furniture ensures students can quickly and easily configure layouts themselves.

**Collaborative Surfaces**

There are now a multitude of possibilities when it comes to collaborative surfaces. Roll-out whiteboard surfaces and chalkboard paint are widely available. Even thought to screw a whiteboard onto a tabletop, write on glass with glass pens or introduce furniture with writable surfaces?

**Materials and finishes**

Materials and finishes can be used to define space and function. This may be as simple as a rug, through to coloured carpet and wall linings. Screens, mobile partitions and furniture walls can provide various levels of privacy, interest and storage while dividing space.
School architecture matrix

Through reflection on these types of communication devices, I experimented with how I could develop a common language between the different pedagogies I'd been researching through the PhD, and their link to space. What seemed to be an issue was that even within the discipline of education, each education theorist seemed to have their own vocabulary.

To develop a common language between architects and educators, I was interested in understanding whether the difference in words was because they were describing different things, or if different words were describing the same thing.

This idea is tested through the ‘school architecture matrix’, where I map the language used in the UK study, ‘A holistic, multi-level analysis identifying the impact of classroom design on pupil’s learning’ (Barrett et al. 2013); the Reggio Emilia schools; and the design patterns of FNI in The Language of School Design (fig 15).

UK Study

Across the top of the matrix the spatial characteristics from the UK Study are mapped, to provide a basis for language comparison. The UK study claims to have found a 25 percent improvement in academic performance when particular architectural elements are present. The research findings identify the spatial, environmental and material qualities that informed the findings. The study is scientific-based and the qualities are described through words without images to illustrate the description. This makes the interpretation and application of the research challenging for architects, who use spatial and visual languages, when the research findings are removed from the context of a real school space.

Reggio Emilia schools

In the centre of the matrix, are the architectural qualities used by the Reggio Emilia schools in Children, Spaces, Relations (Malaguzzi, Zini & Ceppi 1998), with the images sourced from a study tour to Reggio Emilia during the PhD. The Reggio Emilia schools are acclaimed internationally by educators, and view the architecture as the third teacher (after teacher and student peer learning), with a strong understanding of the connection between pedagogy and architecture. The schools embrace diversity and are custom-designed to meet the needs of each particular school community. Reggio Emilia have a poetic approach to describing space, and when I visited the schools, the strong link between the school's values and the built environment was evident.
Fielding Nair International (FNI)
Across the bottom of the matrix are the images and diagrams used by FNI that identify a set of recurring design patterns that need to be resolved in school architecture. The images and diagrams FNI use to describe the relationship between pedagogy and architecture illustrate ideal spatial relationships and the key ideas are presented in a pragmatic ‘how-to’ manner. On the Bendigo Regeneration Project, the design development with the school proved more complicated, and we needed a more diverse approach than FNI’s one-size-fits-all methodology.

School architecture matrix reflection
These three examples represent the diversity in language surrounding school architecture. Through mapping the elements in the matrix, I was looking for ways of simplifying the jargon and identifying common elements within the factors considered important in school design. Through the matrix, I found that although the language was different, the UK study, Reggio Emilia schools and FNI were interested in the same qualities, but viewed their value slightly differently.

Producing the school architecture matrix, was an important step towards developing an understanding that there is less diversity within the language surrounding school design than I first thought. There is potential to develop ways of bridging across the differences, through the use of a common language, to facilitate effective participation processes between educators and architects during school design.
<table>
<thead>
<tr>
<th>Project</th>
<th>Spatial Choice</th>
<th>Spatial Flexibility</th>
<th>Spatial Connection</th>
<th>Environment Sound</th>
<th>Environment Temperature</th>
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<td><strong>UK Study</strong></td>
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<td>A wholistic, multi-level analysis identifying the impact of classroom design on pupil’s learning</td>
<td>“Any design features that distinct characteristics of the room allow the sense of ownership”</td>
<td>“Region size helps pupil to learn better without overcrowding”</td>
<td>“Make the corridor, quicker the movement can be”</td>
<td>“The windows are towards the quiet area; There is no busy activity area adjacent to the room”</td>
<td>“Rooms with south façade (north in AUS) can receive more sun than any other orientated rooms”</td>
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<td></td>
<td>“The facilities are comfortable with high quality, supporting the learning activities”</td>
<td>“Easier the teacher change the space configuration, more teaching methods can be adapted to pupils learning.”</td>
<td>“The corridor can easily change the space configuration”</td>
<td>“Large and visible picture and or landmarks are along the pathway”</td>
<td>“Underfloor heating is better when it comes to evenly distribute the heat with a thermostat”</td>
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<td></td>
<td>“Classroom has a high-quality and purpose-designed Furniture Fixtures &amp; Equipment (FF&amp;E)”</td>
<td>“More zones can allow varied learning activities at the same time”</td>
<td>“The pathway has clear way-finding characteristics.”</td>
<td>“It is easier for pupils to concentrate as teachers when the classroom is rectangular on plan rather than a square”</td>
<td>“More carpet area is, less reverberation time (RT) can be.”</td>
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<td></td>
<td>“The desks and chairs are comfortable, interesting and ergonomic.”</td>
<td>“Interesting (shape and colour) and ergonomic tables and chairs.”</td>
<td>“More zones can allow varied learning activities at the same time”</td>
<td>“The chairs have rubber feet.”</td>
<td>“Rooms with south façade (north in AUS) can receive more sun than any other orientated rooms”</td>
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<tr>
<td></td>
<td>“Interesting (shape and colour) and ergonomic tables and chairs.”</td>
<td>“The storage and/or breakout space are always available and set used for other purpose”</td>
<td>“The room is near the main entrance and other specialist rooms, e.g. library, music, café etc.”</td>
<td>“It is easier for pupil’s to concentrate on teachers when the classroom is rectangular on plan rather than a square”</td>
<td>“More carpet area is, less reverberation time (RT) can be.”</td>
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<th>Transformability</th>
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**FNI Education Consultants**

**School Pattern Language**

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*fig 15: School architecture matrix.*

FNI Design patterns (Source: The Language of School Design, FNI)
### Environment

#### Air Quality

- The room is far away from the polluted area, e.g. factory.
- The air exchange is quicker when the opening size is bigger.

#### Complexity

- Bigger the building area is, more potential opportunities for the school to provide alternative learning rooms and spaces.
- Bigger building area can provide diverse opportunities for alternative learning activities.

#### Light

- Daylight can penetrate into the room from more than one orientation.
- Daylight can penetrate into the room from more than one orientation and the south side of the building is better towards the sun’s path for most of the year.

#### Material Qualities

- Colour of the wall, carpet, furniture and display can all contribute to the colour scheme.

### Natural Ventilation

- Mixed & Intrinsic Colour
- Mixed Lighting & Tuning of Field
- Mixed Colour & Tuning of Field

### Material Qualities

- Texture
- Applied Colour

### Small & Aromascape

- Minty
- Floral
- Resinous
- Ethereal
- Musky
- Putrid

### Display

- Mixed Lighting
- Transparency
- Mixed Colour

### Communication

- Teacher Professional Development

### Reflection

- Lateral
- Translucent
- Lagoon

### Depth of Field

- Warm
- Cold
- Mixed Colour

### Colour & Light

- Colour of the wall, carpet, furniture and display can all contribute to the colour scheme of a classroom. However, the natural light can penetrate into the room colour (wall and floor) that plays the most important role.

### Garden

- Garden

### Views

- Garden

### Outdoor Connection

- Warm
- Cold
- Mixed Colour

### Environment

#### Natural Ventilation

- [Diagram of natural ventilation system]

### Material Qualities: Texture

- Shininess
- Rough
- Dry

### Material Qualities: Colour

- Cold
- Mixed
- Warm
**What is it & why should I do it?**

Going on an **Experience Tour** means immersing yourself totally in a particular environment so you can gain a first-hand perspective of the situation or context. Experience Tours can help ‘ground’ your thinking; they give you a clear perspective for developing ideas that are intimately connected with the people you’re working for.

This tool provides a structure for reflecting upon and collecting insights from your first hand experiences. There are guidelines to help you focus on the experiences of the people you are trying to understand, and to collect the type of materials you will need afterwards to start developing ideas.

**HOW TO USE IT**

Experience Tours are a good way to spark inspirations by learning first-hand about what makes a great experience – or even what not to do, in the event that you encounter a negative experience. As going on an Experience Tour often means being out and about, it may be difficult to make structured notes on a worksheet. Take a good look at the questions on the worksheet before you go out to get some prompts on the things to look out for.

You can either fill out the worksheet as the Experience Tour progresses, or use it to jot down quick reminders and then sit down later to fill in all the details.

The idea is to really try and reflect upon the experience and understand the deeper layers - think about how it makes you feel, as well as exactly what happened. You can compile one worksheet for every tour you make and later compare these to find relevant connections or even differences.

The questions on the worksheet are examples, you can customise the worksheet to make it relevant to your work.

```
<table>
<thead>
<tr>
<th>What is the focus for this tour?</th>
<th>What information is used? What’s missing?</th>
<th>What works well?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the practices observed?</td>
<td>What products are used?</td>
<td>What doesn’t work well? What can be improved?</td>
</tr>
<tr>
<td>Who is involved?</td>
<td>What is the environment like?</td>
<td>Additional notes &amp; remarks</td>
</tr>
<tr>
<td>What is the environment like?</td>
<td>Additional notes &amp; remarks</td>
<td></td>
</tr>
</tbody>
</table>
```

**I want to clarify my priorities by learning from first hand experiences**

---

**fig 16: Example of Design Thinking Tool - Experience Tour, n.d., Nesta.**
(Source: www.notosh.com/lab/design-thinking-tools-to-help-make-thinking-visible-nesta-diy)
Design thinking tools
To make participation work, a set of devices is needed to ensure that participants and architects are on the same page and have the tools to facilitate this. Nesta in the UK have developed ‘design thinking tools’ (Nesta n.d.) that are used to collect information from participants (fig 16). These spreadsheets are a device that could be used to collect more specific briefing information from the school in the design process. This format recognises that different types of tasks produce different types of outcomes. The type of information required is recognised and the engagements with participants are designed towards obtaining that type of information.

This type of approach could be used in my own practice to set specific objectives for consultation sessions with the school. This could provide a more focused discussion, to reduce the amount of time spent on issues that don’t impact the architecture, as experienced in my past projects. This could lead to a more efficient pathway through the school design process and the design of more effective school architecture.

Stanford Design Innovation Process Method
Through recognising the need for a more focused design process, I’ve looked for other process examples with an emphasis on design and collaboration. At Stanford University in the US, industrial design students use the Standford Design Innovation Process Method (Stanford University n.d., p. 3), focusing on design thinking, but also linking to a structured cyclical process (fig 17). This is used as a way to produce creative solutions to complex and challenging issues through collaboration across different disciplines. The cyclical process works through a series of steps designed to allow the understanding of the problem that needs to be resolved. The user continues to work around the cycle until the design problem can be clearly articulated. This method provides insight into the need for a structure to using my own school design tools.
fig 18: Sandringham College design process diagram mapped on three key relationships, October 2014.

fig 19: School design tool concept diagram mapped on three key relationships, October 2014.
Reflection

The research into the precedents for the concept of the school design tools provided insight into potential ways of engaging in participation processes with a school to develop the brief and architecture. To establish what types of school design tools would be useful, I began by diagramming the design process on my past practice projects and projects from the School Community chapter (fig 18). The proposition of the school design tools was developed concurrently with the research into each pole, and their initial development built on my earlier three key relationship diagram (fig 20). The projects were reflected on through focusing on the relationships between the school community, architecture and pedagogy poles that I’d identified earlier in the PhD. When I mapped the relationship interactions between the projects, I looked at how the relationships worked between the poles and what was inhibiting them from working together effectively. Through this process, I was interested in an increased understanding, firstly of the role each pole played and, secondly, how they related to and influenced the other two poles in the school design process.

Through the school design tool concept diagram (fig 19) I looked at where recurring issues arose between the school community, architecture and pedagogy poles during the school design process. These issues then became points of intervention, where the architect could do focused work through the tools to strengthen these areas and assist in bridging the gaps between the three poles. In this way, the school design tools operate in-between the poles, to assist in facilitating how they can work more effectively together. In the diagram, the location of the tools is an example of where the tool could be used. However, as I developed the tools, I identified further places the school design tools could assist in the school design process, which is discussed in the Sandringham Project chapter.
fig 21: Projects with Sandringham College for development of school design tools.
Through this diagramming process, five potential issues arose in the areas of school identity, observation, communication, design intent and prototyping, where the architect could use the tools to bridge between the relationships the three poles and facilitate the participation process (fig 21). The name of each tool is broad, and I selected them to assist engagement with the school to empower the school community to participate. This means the focus of each tool needs to be clear and easily understood by the school to encourage their involvement in the discussion. The tool names are deliberate, avoiding jargon or overly technical language, to assist staff in engaging with the issues, with the exception of the design intent tool, which may need further explanation to a school community for its role and significance in the school design process.
References


Smart green schools: the unofficial overview (SGS), 2010, [Parkville, Vic.]: Faculty of Architecture Building and Planning, University of Melbourne, c2010.

4.2 Sandringham Project

The Sandringham Project focuses on the development and testing of how the five school design tools work in practice. The tools consist of the school identity tool, observation tool, communication tool, design intent tool and prototype tool. The Facades Project masterplan has formed the basis for the design of the Sandringham Project, with the tools used to evolve the project into a design proposition for the Sandringham College senior campus. This led to a deeper understanding of the type of information the tools can collect and how they can assist the architect in the aspiration of designing effective schools.
fig 01: School design tool loop diagram.

fig 02: Facades Project Senior campus, in collaboration with Professor Martyn Hook.
Introduction

The school design tools proposed in the School Design Tools chapter were developed from reflection on my past practice projects and projects from the School Community chapter. The five tools are the school identity tool, observation tool, communication tool, design intent tool and prototype tool.

To develop the proposition of the school design tools, I used the tools while working on the development of the Facades Project masterplans with Sandringham College. While the design outcome is speculative, each of the school design tools were tested with the Sandringham College school community, who participated in the PhD research. This provided mutual benefit to the school and to my research, as the school showed interest in the development of the school design tools and how the tools could inform the development of work they were doing with Clarke Hopkins Clarke architects (fig 01-02).

Through the Sandringham Project I discovered that certain issues kept arising that were creating challenges in the design process. I found that these issues weren’t unique to Sandringham, I’d experienced them while working on a number of school design projects, as highlighted in the PhD research. However, what I’d learnt through the PhD research provided me with new skills on how to reflect on the design process and to articulate new ways of working to resolve the issues to facilitate the participation process between the three poles in the development of the architecture.
School identity tool

The school identity tool is designed for use with the school community. It aims to facilitate the development of the school identity and an understanding of how this could connect with and inform the architecture and pedagogy.

Past practice approach

Each of the projects with Sandringham College in the School Community chapter reveals a different view of what school identity means to the school. For example, in the Design Studio, the RMIT architecture students explored how school identity can be linked to pedagogy and represented through the visual language of architecture. Likewise, in the Facades Project, the regeneration of the school identity informs the key moves in the masterplan to create a new public image of the school. Whereas in the school design adviser role, I observed the regeneration of the school identity occurring independently and in parallel to the development of the Clarke Hopkins Clarke masterplans, rather than being adequately developed to inform it. These projects highlight the necessity for the school to engage in pre-brief work to develop the school identity, prior to the design of the architecture, so it can inform the pedagogy and architecture poles.

Through reflection on these projects, I realised school identity could have been more effectively developed in my past practice projects, where it had played a minimal role in the development of the architecture. Examples of this include the Mt Ridley P-12 College and Bendigo South East College, where school identity was expressed in specific ways. At Mt Ridley, a consistent architectural style and material palette was used to unify the buildings across the campus, with different colours allocated to give each building its own visual identity. Likewise at Bendigo South East College, each of the four learning communities were given a unique colour to associate it with a particular year level.
Developing tool

The school identity tool, is designed to assist the architect to work productively with the school community to develop its school identity and investigate how this can inform the architecture and pedagogy.

On the Sandringham project, I explored how the tool might assist in creating a stronger connection between the values of the school community and the architecture. In the school design adviser role, I observed that as part of the masterplan project, the school went through a process of rebranding, revising the school logo, vision and values to create a new public image for the school. The vision became ‘Sandringham College provides an environment in which diversity, depth and quality of curriculum enables our students to become resourceful independent learners’ (Sandringham College 2013). The school identified its values as ‘achievement, creativity, independence, integrity and respect’ (Sandringham College 2013). However, during the masterplan stage there was little time in the program to look at how these values and the school vision could inform the pedagogy and architecture.

The relationship between values and representing them through architecture is challenging. Values represented through architecture in symbolic ways may not be clear to the viewer, or could be interpreted in different ways. Architect Sir Norman Foster describes that ‘architecture is an expression of values – the way we build is a reflection of the way we live ... at its most noble, architecture is the embodiment of our civic values’ (Tholl 2014, p. 22). Foster’s Reichstag, the new German parliament in Berlin (fig 03), is an example where the design of the architecture and its materiality have been used to symbolically represent a rebirth of democratic values for the country. Both the politicians and public enter the building from the same point, representing equality and transparency. The glass rooftop cupola acts as a landmark in the skyline and as a symbol of German democracy. The public can climb the ramp to an observation platform ‘allowing people to ascend symbolically above the heads of their representatives in the chamber’ (Foster + Partners, nd, p. 2). In a similar way, the Senedd National Assembly for Wales by Sir Richard Rogers (fig 04) ‘embodies democratic values of openness and participation’ (Rogers et al, n.d. p. 1) through its design and transparent materiality, empowering the public. In both of these projects the intent of the design gestures may not be immediately apparent, but the design has symbolic intentions and value to the community it’s designed for.

My interest in the role of the architect in school design is being able to interpret the values of a school community and create meaning for these through the architecture. This can be seen in the work of architect Susanne Hofmann from Die Baupiloten at the Lichtenbergweg Kindergarten in Leipzig Germany. Consulting with the kindergarten children during design through games and activities, Hofmann obtained feedback from the children on their ideas for the space and the atmospheric qualities of their school. This process involved the kindergarten community in the design and gave them a sense of connection, ownership and belonging to the architecture. The symbolic intentions of the design may not be obvious to outsiders, but it holds symbolic value for the kindergarten community.
Visiting the Reggio Emilia schools in Italy also provided insight into how visions and values can be reflected in the architecture of schools, such as in the Belvedere School (fig 05). School values such as democracy informed the practice of the pedagogy and translated into the architecture in plan, section and elevation. In a physical sense, democracy was interpreted as making learning visible, where students could see what was going on in adjacent spaces, limiting the amount of things that went on behind closed doors. In plan, this played out through the connection of spaces, where they flowed into each other in planning (fig 06). In elevation and section, the idea of democracy played out through the use of mezzanine floors with glass balustrades, creating a visual connection between ground and first floor. Internal windows to walls dividing spaces created visual links, while providing a level of acoustic separation (fig 07). Through these physical attributes, the idea of democracy could be experienced and practiced in the pedagogy through the use of these spaces and the visible connections they created. So the Belvedere Reggio Emilia school provided an example of how the vision and values can be connected with not only the pedagogy, but the architecture.

In the Reggio Emilia schools, they have a broad range of architectural qualities that are seen as valuable in the design of their schools. These have been researched and documented by Reggio Children and the Domus Academy Research Center in *Children, Spaces, Relations* (1998). These qualities were used in my school architecture matrix in the *School Design Tools* chapter. In the book, these qualities are described as ‘design tools’ in
Part of the school identity tool is working through the school’s values and identifying the difference between values that could be reflected in material ways and those that are expressed in immaterial ways. The aspiration is that the use of this tool leads to the identification of values that are practiced through the pedagogy and values that could potentially inform the architecture, such as through form, planning and materiality, leading to a more conscious and intentional way of designing.

Through reflection on my experience working on the Design Studio, Facades Project and in the school design adviser role with the school community, I became interested in creating a stronger link between the values of the school and my architecture. Visiting the Reggio Emilia schools in Italy provided precedent for how values could start to manifest themselves through the architecture in symbolic and spatial ways. Prosser’s research developed this further, describing the complex nature of a school’s culture and its capacity to be represented through architecture and practiced through pedagogy. This research generated an interest in exploring these ideas further in my future practice projects. Part of this tools aim is to reveal the visual culture of the school, enabling its influence to be better understood in my architecture.

In the development of the school identity tool on the Sandringham Project, I became interested in understanding the relationship between the physical space and the connection between the school’s vision and values and the school’s culture. Visual culture in schools is discussed by Dr Jon Prosser from the School of Education at the University of Leeds, UK in his paper, ‘Visual methods and the visual culture of schools’ (2007). ‘It’s important to recognise that the visual culture of a school is a combination of generic and unique elements. Generic visual culture describes observable, inscribed and encrypted similarities of schools in terms of visual norms, values and practices, which constitute taken-for-granted visual schooling. However, because schools comprise individuals, agency and the capacity to (re) interpret generic visual culture, school people create their own unique visual culture’ (Prosser 2007, p. 14). This describes the complexity of a school’s culture and its components.
School identity tool and school community pole

In the school identity diagram, the five Sandringham values are located at the core and are surrounded by the role these values play as ideas on the types of learner, behaviours and practices of the school community. At Sandringham, the values provide insight into the school's ideas on the qualities and attributes they're intending to foster in their students and their goals for the students' future directions. There is strong emphasis on student achievement, demonstrated through the Sandringham College motto of ‘inspire, excel, pathways to success’ (Sandringham College 2013). The school's education model is based around excellence, with the majority of students going to university post-secondary school and a small proportion going to TAFE or straight into the workforce. Achievement is also emphasised in promotional material such as 2013 Another Year of Great Achievements (Sandringham College 2014), which features student achievements and the academic trajectory of high-achieving VCE students and their tertiary placements after graduation. The school values are intended to give students ethical principles they can continue to practice through their life. ‘A positive relationship, based on mutual respect and our college values, is established between staff and students. This is very beneficial to student learning. Our rules set strong boundaries and ethical principles, which help set students up for life’ (Sandringham College 2014, p. 2).

Tool pilot on Sandringham project

I started to explore this potential connection between the values and architecture through my practice work. Atkin's school values diagram in my case study work at Dandenong provided precedent for how the school vision intended to inform the principles and practice during design stage (fig 08). I was intrigued by the clarity of this diagram to capture and make connections between different ideas and elements. I developed a similar approach as a device to communicate and test the relationships I was interested in building between the values of the school community, how they inform the practice of the pedagogy and manifest themselves in the architecture of the Sandringham Project (fig 09). In this diagram, I’ve speculated on how the five values of the Sandringham College school community inform its teaching practice through pedagogy and identify ways that they could inform the architecture in symbolic and spatial terms.
fig 09: School identity tool diagram, October 2016.
School identity tool and school community pole
Through a closer study of the Sandringham College values and aspirations for their student body, I gained new insights into the identity of the school community I was designing for. This included the emphasis on achievement, a critical quality for students at VCE level, with performance determining their future pathways. The values are also shared by the staff in an environment of mutual respect. Reflecting on the promotional material of the school gave me insight into the school’s aspirations for its public identity and the significant achievements of its students, recognised in recent years through Premier’s Awards for the top Victorian students in VCE subjects. Studying the school values gave me a deeper understanding of the school community than what I’d gained while working with Sandringham College through the three projects described in the School Community chapter and it allowed me to recognise that the school had a clear sense of identity for its student population (fig 10).

School identity tool and pedagogy pole
The pedagogy practices surround the school community values in the school identity diagram. The intention is that the values should inform and be reflected through their practice. During the development of the Sandringham College masterplans, and my participation in this as school design adviser, the school chose the 3i pedagogy as its future education model. ‘Students are supported in their learning by a teaching philosophy that places the learning at the centre. At the senior campus, students are offered breadth and depth of subject selection. Learning pathways are structured to enable students to choose their preferred course. Teaching and learning are centred around the principles of the 3i’s – instructional, interdependent and independent learning. This recognises the importance of student involvement and engagement in academic progress’ (Sandringham College 2012, p. 2). The school saw this model as a pedagogy that would bridge the traditional classroom practices in its existing buildings and the new types of pedagogies that would be enabled through the new architecture. The 3i’s are modes of learning already used by teachers in the

‘Sandringham College motto:
‘inspire, excel, pathways to success’
(Sandringham College 2013)

‘The young adult environment, which espouses the values “Achievement, Creativity, Independence, Integrity and Respect”, is underpinned by a belief in the importance of personal responsibility, decision-making, care for others and the environment.’
(Sandringham College 2014, p. 2)
existing classrooms and could be practiced in the new architecture. However, the design of the new spaces provides a greater variety of spatial settings and facilitates a broader range of pedagogical approaches to build on the 3i modes learning base (fig 11).

Through reflection on the school’s intended pedagogy, I thought the proposed 3i education model was narrow and limited in comparison to the school’s aspirations for the learner and its focus on providing breadth, depth and program choice for students. The 3i pedagogy didn’t seem to reflect this and I believed the school community needed a broader pedagogical model to foster the values they wanted to practice and develop in their students. In the development of the Sandringham Project, I speculated on generating a longer-term proposition for the school’s pedagogy.

My PhD research has shown the tensions that exist between the short-term nature of pedagogy and the potential 35+ year lifespan of architecture, indicating that longer-term aspirations for teaching and learning need to be considered. I thought the 3i model could assist during the transitional period of occupation of the new architecture, but there needed to be a plan for the duration of the building’s occupancy. This informed the development of the pedagogy layer in the school identity diagram, which I’ve populated with a broader range of pedagogical practices in addition to the 3i model, which could be incorporated into the design. These have been informed by the observation work conducted at the school through the use of the observation tool, which revealed a greater variety of pedagogical practices already in use across the school. These activities were also reviewed against the educational activities identified through Featherston’s Learning Settings at Dandenong and FNI’s Learning Modalities at Bendigo South East College to ensure a broad range of intended pedagogy could be accommodated in the new architecture.

‘Teaching and learning are centred around the principles of the 3i’s - instructional, interdependent and independent learning’

(Sandringham College 2012 p2)

‘A positive relationship, based on mutual respect and our college values, is established between staff and students. This is very beneficial to student learning. Our rules set strong boundaries and ethical principles, which help set students up for life’

(Sandringham College 2014, p. 2)
In the evolution of the school community values and pedagogy, some values were easier than others to evolve into architecture. For example, ‘creativity’ has obvious associations with architecture, as a creative profession, and could be linked to this value through an ‘innovative design approach and design outcome’, ‘complexity’ in design to enable creative ways of working, emphasising the ‘unique advantages of each campus location to provide program variety’, and ‘flexibility’ in design to accommodate creative teaching and learning environments. Whereas other values such as ‘respect’ are harder to reflect in the architecture in a direct manner, but could potentially inform the design in abstract ways, such as in the Reggio Emilia schools. The design could use spatial qualities such as ‘choice, flexibility and connection’ to ‘empower’ students and staff, and encourage ‘ownership and belonging to spaces’. The design of a ‘comfortable environment’, which is ‘safe and secure’ treats the students and staff with respect and, in turn, encourages them to ‘respect the environment’.

School identity tool and architecture pole

Architecture forms the outer layer of the school identity diagram, with the intention that the values of the school community are reflected in the pedagogy and manifest in the architecture (fig 12). Sandringham had an interest in providing an environment that was connected to its values. ‘The young adult environment, which espouses the values “Achievement, Creativity, Independence, Integrity and Respect” is underpinned by a belief in the importance of personal responsibility, decision-making, care for others and the environment’ (Sandringham College 2014, p. 2). However during the development of the masterplans, and while working as school design adviser, there was little time to develop how this could work. In the school identity diagram, I’ve reflected on the school values and pedagogy and how these could be facilitated, supported and represented in the physical environment.
School identity tool reflection
The preparation of this diagram for the Sandringham Project revealed that the school has a strong sense of the values and attributes they aimed to develop in their learners, but an underdeveloped understanding of how they did this through their pedagogy. The connection of the school’s values with design aspirations and architecture created more awareness of the role of the school’s culture in influencing the physical environment. Revealing this gives the school the opportunity to more actively participate in the design process and achieve a balance between the three poles during the school design process.

Through developing and using the school identity tool I came to understand its potential application and use in my practice. The school identity diagram assists in differentiating and visualising the relationships between the school’s aspirations for its learners, how this is practiced in its pedagogy and is facilitated by the architecture. This diagram also acts as a communication device through the communication tool (discussed further on), which describes the relationship between the values, pedagogy and architecture, providing an object that can be discussed, reflected upon and developed between the architect and the school community of students and staff. This provides an opportunity to review the school values and ‘if’ and ‘how’ the values can inform the pedagogy and be translated into architecture. This process can highlight deficiencies and gaps in the school identity that require further research and reflection by the school.

This process also acknowledges the limitations in translating language into architecture, where some values are easier to translate than others. In Norman Foster’s Reichstag and Richard Rogers’ Senedd, values such as democracy informed the planning and transparent materiality of the buildings, evoking ideas surrounding democracy. Whereas in the Reggio Emilia schools, spatial qualities and materiality such as light, colour and texture can be used in a non-symbolic way to create environments that promote the values. For example, ‘the roof of the play house does not have to be tiled to represent a real house, but could be in light blue shades, to encourage metaphor and leave room for the children’s own interpretations, letting them complete the icon’ (Malaguzzi, Zini and Ceppi 1998, p. 69). Through the use of colour, the value of creating an environment that promotes the children’s learning is achieved.

The school identity diagram brings together the information collected on school identity through the use of all the school design tools and communicates the relationships between the school community, pedagogy and architecture poles. In the application of the school design tools, the school identity and observation tools would be beneficial as part of a pre-brief process. This allows more time for the development of the school identity and capacity for it to influence the pedagogy before the development of the architecture.
Observation tool

The *observation tool* is designed to develop an understanding of tacit knowledge, informing the use of space in the education environment.

Past practice approach

The comparative analysis diagrams of my past practice projects highlighted areas of deficiency in the school design process and limitations in the participation briefing methods I’d used. In these projects, the consultation sessions with staff consisted of various forms of arranged conversation, focused on different space types to find out things, such as the desired spatial qualities, the best type of environments and their relationships, material qualities, fittings and equipment. The teachers tried to describe what they needed in the new school design, but seemed to find it challenging to think beyond what they already had in current teaching spaces, to imagine new or improved ways of designing the spaces. This was challenging for the architect to then curate the information collected, as the teachers were describing what they had in traditional classrooms, when the new school was being designed with an open plan pedagogy that would provide very different types of spaces.

The issues with this process were highlighted through the post-occupancy case study work at Bendigo, which showed gaps between the design intention and how the spaces were being used. Vaughan Prain et al.’s book, *Adapting to Teaching and Learning in Open-Plan Schools* (2014), studied the different spatial relationships and pedagogies the school trialled in the first three years of occupation to learn how to use the spaces most effectively, with their following book *Personalising Learning in Open-Plan Schools* (2015) discussing the most effective way of teaching in open plan spaces. This highlighted that there was important information being missed in the briefing process and that new approaches were needed to develop a greater understanding of the school’s needs.

Through reflection on these issues I realised how challenging it was for teachers to describe what it is they actually do and that in five years of designing schools I’d never just sat in a classroom and observed what they do. Briefing had been conducted in meeting rooms, outside the teaching spaces and the environment in which they work. Students had sometimes participated in briefing sessions, but again it was a fabricated dialogue, asking them to comment on issues they sometimes new little about. In the *three key relationship diagram*, I’d identified that the school’s vision and values informed the pedagogy and that I needed to understand the interactions between the teachers and students within the space.
Developing tool

Recognition of this led to the development of the observation tool, so that I could firstly observe current teaching practices and how teachers and students use the environment to support this. Secondly, through the observation practice, I hoped to fill the gaps between what the teachers were describing in consultation sessions and what they were doing in practice. This could assist the architect in working with the school to develop an understanding of tacit knowledge to inform the use of space in the education environment. It was envisioned that the observation tool would be used alongside the school identity tool, with one feeding into the other.

As discussed in the school identity tool, Prosser identified that observation can be used as a strategy to read the visual culture of a school. ‘Generic visual culture describes observable, inscribed and encrypted similarities of schools in terms of visual norms, values and practices, which constitute taken-for-granted visual school’ (Prosser 2007, p. 14). The observation tool can be used to see how the school works in reality, as opposed to the sometimes idealised descriptions given by teachers and students in consultation sessions. The observation tool employs different types of approaches to document and record the existing conditions to generate new types of information. Prosser discusses the visual culture of a school and the recording of observations. Methods include research-generated images; found images such as old school photographs and architectural drawings; video as record of complex interaction and/or used for photo elicitation; participant generated images such as children’s drawings and photographs; researcher generated maps and photographs; and of course researchers’ observations (Prosser 2007).

The approach of the observation tool has also been influenced by the work of Dr Nigel Bertram in his PhD, ‘Making and using the urban environment: furniture, structure, infrastructure’ (Bertram 2010). In his analysis of existing spaces, such as the Hopetoun House Hotel in Jeparit, Bertram’s careful observations describe the social behaviours of the users in association with the physical environment, from the urban fabric, through to the architecture and furniture. This all-encompassing approach, observing at a range of scales, provides a deeper reading of the spatial use and possibilities for design interventions.
Tool pilot on Sandringham Project

At Sandringham, the observation tool was used to learn how the existing school community worked and to understand the existing spatial conditions (fig 13-14). To assist in informing the development of the Facades Project masterplan, I wanted to understand how the site was currently used. Observations were done of the existing site, mapping how spaces were used, by whom, and how their use changed over the course of the day. The approach was to walk around the site, taking a photographic record and sketches of the spaces and how their use changed over time, such as before school, during class, recess, lunch and after school. Initially, I recorded my observations on an existing conditions masterplan through annotations and association of areas with photos (fig 15). However, I found that this provided little additional information to what I'd previously observed of the site use in the development of the Facades Project discussed in the School Community chapter.

Following this, I started to look more closely at the photographs and what they revealed. The photographs capture the moment, but only reveal so much. Building on the graphic technique identified in the Pedagogy chapter, I started annotating the interactions between the students, their environment and whether the environment was being used differently to the design intent. To relate the observations back to the three poles, the annotations are ‘architecture’, ‘pedagogy’ and ‘school community’. ‘Furniture’ and ‘landscape’ are seen as part of the architecture pole, but have been labelled separately to acknowledge that furniture changes and evolves in comparison to the fixed nature of architecture. Likewise, the design of the landscape is developed by a landscape architect under the direction of the architect. The combination of the annotations with the photos provides a deeper reading of the space and how it is used. This graphic technique has been an important outcome of my PhD research, as it allows me to develop a deeper understanding of the relationship between the architecture, pedagogy and school community poles and to interpret what I see (fig 16-18).

The observations made through the annotations of the plan and photos show the bulk of the student community gathered around the central spine from the canteen to the library. These buildings and the adjacent outdoor spaces served as the main social spaces. There were pockets of students in smaller groups nestled between buildings and in nooks and crannies, seeking separation and privacy from the main student body. Noticeably though, there didn’t seem to be 600 students in the outdoor spaces during breaks. Discussions with the yard duty teachers revealed that not all students were on campus as it operated like a university, where students could leave campus if they didn’t have timetabled classes. Mapping how the existing site was used showed the issues with the lack of useable shared public space. Both the central outdoor hard surface areas were being used as staff carparks, restricting the students’ recreational activities on site and fragmenting the school community. It was also clear that the relationship with the broader community and public interface of the school could be improved through public access points.
fig 15: Observation tool used to study existing site.

fig 16: Observation tool used in existing library.

Legend
ARCHITECTURE
LANDSCAPE
FURNITURE
school community
pedagogy
Overall the social spaces of the school community in breaks were fragmented and spread across indoor and outdoor spaces. With the subject centres, such as photography, music and art, providing spaces for students to study and catchup on work during recess. These subject centres gave students a group they could identify with and a specific location on site for their activities. Within these subject centres, students could completely immerse themselves in the world of their discipline, and have ownership over the space. The music rooms, for example, were setup for a garage band, painted dark colours and pasted with band posters and recycled furniture. I completed some observation work of these spaces to see how they were used by the school and opportunities for interventions.

The aspirations of the Facades Project were towards developing cheap and quick solutions through strategic interventions to improve the campus, as discussed in the School Community chapter. To improve each subject domain area required a larger project budget, and so I decided to keep the project focused towards developing the shared spaces, such as the library, canteen and central outdoor spaces, so that the whole school community could benefit from the project.
Observation tool reflection
The techniques used in the observation tool are intentionally quite simple and quick to produce, but going through the PhD research, I’ve learnt new ways of reading the complexities in the information collected on the relationship between learning activities and the spaces they occur within. These observations reinforced the initial ones made in the development of the Facades Project masterplan, which identified the central circulation spine as the most effective point to regenerate the campus. However, the use of the observation tool gave me more detailed information on the types of activities that were naturally occurring within these spaces to inform the development of the design. This also allowed me to fill the gaps between what the teachers were describing in consultation sessions and what they were doing in practice.

Use of the observation tool acts as a checking point and can be used to observe and reflect on whether the school community values, pedagogy and intentions for the architecture developed in the school identity tool, were a development of what's already in practice or a radical shift for the school. This issue was discussed by Prain et al. (2014), where research illustrated the challenges for the school in adapting to a new space when it's a radical change from existing practice, with a smoother transition into the new spaces made possible through more gradual change.

This tool is useful on projects with an existing school community and the observation tool is a type of post-occupancy evaluation of existing spaces and their use. For a greenfield site, where there's no existing school community, the tool could be adapted to the study of spaces in schools near the area of the new school or precedents influencing the school’s development. This would still provide an insight into the types of interactions the school was interested in facilitating in its new school and its relationship with the architecture, and assist in the briefing process.
Communication tool

The communication tool may assist the architect in working with the school community through bridging the knowledge and language gaps between the different disciplines of education and architecture, using visual representation beyond the traditional drawing types used by architects.

Past practice approach

Through reflection on my past practice projects through the comparative analysis diagrams I identified deficiencies between the collaborators in the school design process. Through further research into the methods used by other architects and designers in the development of the school design tools, I identified knowledge and communication gaps in the working relationship between architects and educators in designing schools. With new awareness of these gaps I was able to further reflect on my school projects completed before the PhD and the types of methods used to discuss ideas with the school.

In participation processes led by the architect with the school, the communication devices used in my past practice projects were those common to the architectural profession. These approaches were centred around visual and spatial communication of ideas, such as sketches, architectural drawings, diagrams, precedent images and 3D drawings. Examples of this can be seen during the design development of Crusoe Secondary College with HASSELL, where we used diagrams, sketches and models to explain to the school community stakeholders how key briefing ideas had been incorporated into the design (fig 19-21).

Through the PhD research I’ve come to recognise that the architecture and education professions each have their own professional language, which supports and defines each discipline. Architects and educators can have very different interpretations of the terms commonly used by the other. This issue is discussed by architect and Associate Professor Clare Newton at the University of Melbourne in reflection on interdisciplinary work between architects and educators. ‘Language helps define outsiders to, and cohorts within, knowledge domains. As different disciplines meet together on a common topic, there is a need for each discipline to empathise with others new to the discipline by understanding that language can alienate and confuse and by attempting to modify language into more accessible terms’ (Newton 2009, p. 9). This is also discussed by educator and research fellow Dr Susan Wilks at the University of Melbourne, who notes that when teachers are listening to architects present new designs for their school, not all teachers will have a good understanding of what's presented (Wilks in Newton 2009, p. 9). ‘The vocabulary and ways of representation used by architects, facilities experts, acoustic engineers and builders are foreign to teachers and vice versa (Wilks cited in Newton 2009, p. 9).
Developing tool

The *communication tool* has been developed to assist the architect in working with the school community through bridging the knowledge and language gaps through the use of visual representation beyond traditional drawing types used by architects.

On the Sandringham Project, the *observation tool* highlighted how the school community used its existing spaces. I recorded how the students and teachers were using the environment in their learning through diagramming, as well as the interactions between students, peers and teachers. Initially this was to assist in the development of my own understanding of the relationships between the pedagogy and environment. However through further research in the development of the *communication tool*, I came to understand that the objects I was creating could be useful in bridging the language and communication gaps between architects and educators while working with the school community in the design process.
Through a discussion of the proposed school design tools with Associate Professor Yoko Akama, in Media and Communication at RMIT, she described the drawings of my analysis of the use of space in my post-occupancy studies at Bendigo South East College and Sandringham Project as ‘boundary objects’. The nature of boundary objects is that they aim to operate at the intersection between different disciplines, to assist in bridging them. The drawings produced recorded my observations, but could also be used as a focal point for discussions with the school community during briefing consultations, where the educators and architects could both record their understanding and interpretation of the design of spaces (fig 22-24).

Further research into the nature of boundary objects revealed a whole body of research into boundary objects used in participatory and human-centred design. While my research is not concerned with participatory design in the context of participation being prioritised over design outcomes, the discussion of boundary objects provided insight into the development of the communication tool.

Architect drawings are not considered boundary objects, as they are interpreted differently by architects and educators. They are clear to architects, but may be difficult for educators to interpret. For an object to be considered a boundary object it needs to ‘satisfy the informational requirements of different communities of practice’ (Lee 2007, p. 311). Susan Leigh Star and James R. Griesemer defined the concept of boundary objects used in sociology in ‘Institutional Ecology, ‘Translations’ Boundary
Objects: Amateurs and Professionals in Berkeley’s Museum of Vertebrate Zoology, 1907-39’. ‘Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds’ (Star and Griesemer, 1989, p. 393).

This research gave me a greater understanding of how a record of observations could become an object for discussion. These diagrams could be viewed as boundary objects to assist in bridging knowledge and communication gaps between architects and educators. In the Design Studio workshop we ran between the RMIT architecture students and Sandringham school students, the RMIT students made models of existing spaces for discussion at the workshop (fig 25). These models were intended to work in a similar way to a boundary object, to assist in visualising the design process to make it more accessible for the Sandringham students to participate in. This raised the question in my research as to whether this approach could be incorporated into existing school design and procurement processes on schools or if it required additional work and changes.

Tool pilot on Sandringham Project

On the Sandringham Project I recognised that this tool can be used to record observations of learning spaces during the development of the brief and the readings of the spaces could be discussed with the school. The role of photos as points of discussion is described by Prosser in his paper on the visual culture of schools, where photo-elicitation promotes respondents’ and not the researcher’s agenda, aids recall and triggers unanticipated reactions beyond what could normally be expected from interviews (Prosser 2007). In this way, the communication of the observation diagrams could be used to facilitate and prompt different types of feedback than participation methods used in my past school projects.

In the development of the Sandringham project I started to identify other ways this process of recording could work within existing processes in school procurement and tested ways of annotating design drawings to see if it assisted in a deeper understanding of the intention of the space (fig 26-27). Through doing this I realised that this could be used to assist the architect in communicating with the school the design intention of the spaces. Through giving the school this type of drawing, it allows them time to reflect and consider the design beyond the confines of the duration of the verbal consultation session. These drawings can be used to record live feedback and act as a record afterwards for further reflection.
NEEDS SEATING/GATHERING AREA NEAR STUDENT DROP OFF

NEED GREATER VARIETY OF OUTDOOR SPACES

KEEP MAIN CIRCULATION PATH CLEAR

BREAK DOWN LARGE OPEN SPACE CREATE TWO SMALLER SPACES

fig 26: Communication tool used to develop design for Sandringham Project (all images).
Although sketching over the top of drawings during client meetings is common practice in the architectural profession, the techniques used in the communication tool are more specific. They record in a different manner the feedback from architects, educators and the school community, to expose and make visible any knowledge and communication gaps that require further discussion or to be considered in the development of the design. Figures 26-27 provide a summary of feedback obtained, with the source of comments identifiable through the use of different fonts to represent comments from representatives of the architecture, pedagogy or school community pole.

The recording of which pole provided feedback to develop the design assists in tracking the progression of design changes. The drawings can be issued back to the school as part of a return brief and for the school to reflect on. This process could assist school community stakeholders and teachers coming on board with new directions in pedagogy and space, by allowing them to more actively participate in the design process and opportunity to reflect and absorb the discussions afterwards through reflecting on the drawings.

fig 27: Communication tool used to develop design for Sandringham Project.
fig 28: School design tool loop diagram.

fig 29: School design tool loop cycles, October 2014.
School design tool loop

During the Sandringham Project I used the school design tools in a loop-type process. They are designed to assist in identifying and articulating briefing information to inform the development of the architecture. The school design tool loop describes the interactions between the use of the tools and their relationship to the design process (fig 28-29).

The loop process of the school design tools also assists in managing the participation process and the organisation of the school, making it easier for them to understand and contribute. The loop acts as a communication device, with the arrows indicating the sequence of steps. The visibility of this process allows reflection on the decisions that have been made and ensures the message is clear.

This could also provide a new model for a return brief to the school, where the information collected from each tool can be communicated back to the school. This could empower the school community to be more involved in the participation process and encourage the teachers to be willing rather than resistant participants and assists the school leaders in getting the teachers on board. In this way, the school design tools and loop process empower the school community and assist the architect in listening to feedback from the school.

There are three stages in the use of the school design tools, indicated through three loops. The process begins through working around the inner-loop, with a pre-brief development of the school identity and observation of education environments in the existing school. This is followed by communication of the key information and establishment of the brief. The architect works with the school in a cyclical process around this loop until a brief is established. This first loop could be used as part of a pre-brief process to establish the architectural brief, or as part of master traditional procurement stages, such as masterplanning and sketch design.

In the middle loop, following the communication tool is the design intent tool, where the brief is evolved into a clear design intent and then tested through the development of prototype spaces. This could occur in sketch design and design development phases, allowing experimentation before the final design is committed to. The tests in the prototype space can be reflected on and inform the evolution of the overall design.

The outer loop involves the development of successful ideas in the prototype to be evolved into the final design and documentation. This outer loop occurs during the design development and documentation project phases. The school design tools also assist in communicating the key steps for the school community and architect in the design process, identifying key information that needs to be established before proceeding to the next step.

The school design tools make the thinking in the design process visible and assist in communicating where and how the school community, pedagogy and architecture poles need to contribute to the project.
fig 30: Communication tool used to review design on Sandringham College Library extension

fig 31: Communication tool used to evolve design on Sandringham College Library extension

Legend

ARCHITECTURE
LANDSCAPE
FURNITURE
school community
pedagogy
Communication tool reflection

The communication tool has assisted on the Sandringham Project through creating a deeper understanding of graphic communication and how it can be used to bridge knowledge and communication gaps between architects and educators. Through testing with a specific school community, my understanding of the communication tool’s potential application has expanded. Through the graphic recording of the differentiation in the understanding of spaces and its use by educators and architects, the drawings identify gaps in the interpretation of space and where further design development may be needed (fig 30-31).

This assists in bringing together the school community, pedagogy and architecture during the development of the brief and school design. This process empowers both the educators in their capacity to participate in the design process and the leadership of the architects through a greater understanding of the needs of the school community and how they can be met through design. Through applying this technique to drawings already used by architects, these approaches can be easily incorporated within existing school procurement processes. The increase in dialogue, enabled through the communication tool, contributes to more effective school design.
Design intent tool

The design intent tool aims to assist the architect in the establishment of clear objectives and a hierarchy of ideas to inform the architecture.

Past practice approach

In the Reflective Practice and School Procurement chapter I discussed my past practice projects and identified the need for a balance between the three key relationships in the school design process. The architecture, school community and pedagogy poles each have different objectives and influence on the architecture. In this chapter and the School Design Tools chapter, I discussed the challenges in the design and briefing stages and recognised the limitations of design processes used in my past practice work. In the Architecture chapter, through reflection on the contribution the history of architecture has made to school design, I recognised an imbalance in the three key relationships and a tendency for the architecture of my past schools to be driven by the programmatic concerns of the pedagogy.

Reflection on precedent projects showed how architecture has historically contributed to the development of schools and there was a broader range of ways architecture could contribute to school design. This led to my interest in developing new methods of working in my practice through the school design tools, to facilitate a balance between the contributions from the school community, pedagogy and architecture poles in the design of my schools.

In my past school projects we used a number of strategies to communicate design ideas to the school, which were fairly common methods used by architects, such as 2D and 3D drawings, models, and diagrams. An example is Mt Ridley P-12 College, where 3D images, axonometric interior views and fly-through animations were used to assist the stakeholders in visualising the project (fig 32-34). However, through reflection on these projects I’ve become aware of the challenges for schools in interpreting architect drawings as a device to facilitate their participation in the design process. There’s also a tendency for architectural drawings to look ‘finished’, rather than a mouldable object that is open for discussion. Through reflection on the PhD research I’ve become interested in establishing a stronger design intent in my school projects, recognising the contribution it can make to the architecture of schools, and that there needs to be a shift in my practice to facilitate this.
Developing tool

The *design intent tool* aims to assist the architect in establishing and communicating clear objectives and a hierarchy of ideas to inform the architecture, prioritising a balance between the three key poles. Essentially, the *design intent tool* is where the information collected from using the other tools, is brought together and reflected upon.

In the development of this tool, I was interested in finding ways to meet my objectives that are compatible with the design processes architects need to use in government schools, mindful of the tight timeframes that often occur in school design. I’ve researched devices other architects use to communicate design intent and, in particular, the use of diagrams, which is a common strategy used in architecture to communicate the design ideas in a clear manner. Different types of architectural diagrams are used in response to the type of information they’re communicating.

Earlier in the PhD I noted that there seemed to be a lot of irrelevant information collected during briefing sessions with the school community. That is, additional information was provided that was outside of the intention of the consultation with the school. As my research progressed I came to realise that while some of the additional information had little impact on the architecture, there were also ideas that were important to the development of other areas of the school, such as an idea that could be reflected through the pedagogy or immaterial culture of the school community. Part of the development of this tool is creating ways to establish and communicate a clear design intent of the architecture through a
hierarchy of ideas and an understanding of how the architecture accommodates a balance between the other two poles in the *three key relationship diagram*.

Recognition of this led to my interest in graphic techniques used by other architects that communicated multiple ideas through the one device. Architects Atelier Bow-Wow, have developed techniques for communicating different types of information in the one image, alleviating the need for other types of drawings (fig 35). Their drawings contain additional information, communicating materiality, a perspective view, structural information, details and illustration of how the space is inhabited. The drawing ‘provides the appearance of multiple intentions fraught with contradiction and confrontation, organically linked through the medium of specific architectural elements, as well as producing the appearance of unexpected phenomena of light and daily life’ (Tsukamoto and Kaijima 2007). The practice’s work provides an example of how the multiple intentions of the architect, school community and pedagogy could potentially be captured on the one drawing.

fig 35: Communication of different types of information on one image, Atelier Bow-Wow. (Source: www.detail.de)
Tool pilot on Sandringham Project

On the Sandringham Project I’ve used diagrams and drawings to assist in clarifying the project’s design intent. This can be seen in my site analysis diagrams, which use the observation tool to understand the use of the existing site and the communication tool to describe how the proposed design will alter the existing site (fig 36). This type of device can be used to clearly communicate to the school the design intent and act as an object for discussion.

I began experimenting with the graphic technique developed through the observation and communication tools to reflect on how the needs of the school community and pedagogy were being met through the design. I was interested in developing ways of communicating multiple intentions through the one drawing and worked with annotating the plans to communicate this. I evolved the technique as the design progressed and the intentions became clearer and the interactions of the multiple intentions of the three key relationships could become graphically clearer in how they were coming together (fig 37-38).

This technique also works on the perspective views, where I initially began using the technique as a way of reflecting on the design in consultation with the school to assist in its development. As the design and discussions progressed, it became easier to distinguish the ideas (fig 39).

fig 36: Sandringham College existing (top) and proposed (bottom) site relationships with design intent tool.
fig 37: Sandringham College Library reflection with design intent tool.

fig 38: Sandringham College Library reflection with design intent tool.
The *design intent tool* also uses the *school identity diagram* to reflect how the objectives are established at the start of a project, and have evolved into architecture. Through this process, a new version of the *school identity tool diagram* evolves, which represents how the aspirations of the *architecture, pedagogy and school community poles* manifest in the architecture.

This technique is able to serve a range of purposes. Firstly, it allows the architect to reflect on the development of its work and assists in the development of the brief through allowing the reflection of how key ideas have been incorporated into the design. Secondly, the technique can be used to bring together the information gathered through the *school identity* and *observation tool* and enables the drawings to work as boundary objects in discussions with the client, as described in the *communication tool*. Thirdly, this process assists in establishing a clear design intent through a greater understanding of how complex ideas are coming together, so that a hierarchy can be created in the design.

![Diagram of Sandringham College Library](image)

*Legend:*
- **ARCHITECTURE**
- **FURNITURE**
- **LANDSCAPE**
- **school community**
- pedagogy

*Fig 39: Sandringham College Library reflection with design intent tool.*
ACHIEVEMENT

resilient + adaptable students
learners for life excellence
builds school community
creativity

RESPECT

TEACHER

professional development

Flexible to accommodate pedagogies

enhanced school public image
young adult environment

INTEGRITY

INDEPENDENCE

Spatial qualities - choice, flexibility, connection
respect for the environment

Safe + secure environment

Comfortable environment

Ownership + belonging to spaces

Empowering

INFORMAL LEARNING

GROUP WORK

TEAM TEACHING

31's - interdependent learning

Learning about environment + nature

Team work

Social, emotional + spiritual learning

Commitment to design intent

ARCHITECTURE

Pedagogy

Teacher professional development

Student - centred learning

Setting learning goals

Individual learning plans

Creative approach to community space

owie - in dependent study

Peer-to-peer learning

Flexible program

Project based learning

1-on-1 learning with teacher

Presentation

School community hub spaces

New architecture creates new school identity

Flexibility

INNOVATIVE DESIGN + APPROACH

Complexity

Use unique advantages of campus

School community hub spaces

Flexibility

Fig 40: Sandringham College Library reflection using structure of school identity tool, November 2016.
Design intent tool reflection

The *design intent tool* brings together the information collected from the other tools, such as *school identity, observation and communication*. Through reflection on the information collected from the tools, a hierarchy of ideas can be created to be explored in the architecture (fig 40). Through the Sandringham Project, now I understand that I need to keep ideas simple, so it has meaning for the school community, pedagogy and architecture. Coherency between the three poles is also essential, to enable each pole to enhance the project and contribute to the design process.

The physical environment is part of the silent curriculum in schools. Building visual identity through architecture influences the hidden curriculum of schools and communicates ideas about learning. A good physical environment silently communicates messages that students’ learning is valued and respected. ‘Teachers’ and pupils’ everyday behaviours shape and in turn are shaped by school culture, which is manifested visually in the built environment, as well as the patterned behaviours that constitute social structure’ (Prosser 2007, p. 16). This emphasises the importance of the architecture of schools and its ability to influence the learning of students through a silent curriculum.
Prototype tool

The prototype tool allows the testing of new pedagogies and its relationship with space during the design stage, allowing ideas to be refined before design is finalised for construction.

Past practice approach

As discussed in the School Design Tools chapter, many school community members find it challenging during the design briefing stage to imagine different types of learning spaces beyond what they already have. It can also be challenging and intimidating during design for a school to choose and commit to a new pedagogy that they haven’t experienced in practice. My post-occupancy research at Bendigo South East College showed the differences between the design intention and how the spaces were used post-occupancy. The ARC research led by Professor Vaughan Prain also focused on this issue and researched the evolution of teaching practices and how the school used the space in its first three years of occupancy. These issues have highlighted for me the importance to develop a strong understanding of the school’s needs, so that the design can respond to and foster the culture of the school community.

The relationship between architecture and pedagogy is important, with each influencing the other. My case study research of Bendigo South East College showed the potential for architecture to lead and facilitate new teaching practices, as in the case of the Da Vinci studio. However, the undesigned nature of the Einstein studios also allowed the school to shape the internal planning to its needs, which gave the teachers and students a sense of ownership over the spaces. This issue is discussed by Prosser in Visual Methods and the Visual Culture of Schools: ‘Architecture operates as a set of pathways and constraints, facilitating and frustrating parts of the educational mission’ (Prosser 2010, p. 15). For the architect, bringing together the pedagogy and design to work together in a fluid manner is a challenge.

Prototypes have been used during the design of schools to allow the school community to experience and test the architecture and pedagogy for its new school. Prototypes are more commonly used by industrial designers to test new furniture designs, such as a chair, to resolve any design issues before they go into mass production. In architecture, every building is a form of prototype, having not been designed and built before, but it’s also the end product. At Dandenong High School, Mary Featherston worked with the school to create a prototype space in an existing portable during design stage, for the school to trial the proposed pedagogy (fig 41). The prototype space was for a group of 50 Year 7 students and a small group of staff. Featherston describes the prototype ‘certainly confirmed some of the pedagogical directions because the teachers were able to test ways of working and particularly to test working together’ (Newton and Fisher 2009, p. 114). The use of the prototype then gave the school and architects confidence with the design direction prior to the project being built.
Developing tool

The prototype tool allows the testing of new pedagogies and their relationship with space during design stage, so the ideas can be refined before the design is finalised for construction. The prototype is intended to be used by the school in the early design stages of the project, such as masterplanning, sketch design and design development, to provide feedback to the architect for construction documentation.

During this time, the prototype could be used by a range of students and teachers to see how the spaces accommodated different subject areas and ways of working. This would allow the school to test different types of pedagogy and the relationship with space. An advantage of the prototype space is that it could be designed through minor alterations to existing spaces. This would require minimal financial investment on behalf of the school before the idea is built on a large scale.

In collaboration with the school, I could assist in developing a way of recording the teachers’ and students’ experiences in the prototype spaces. As part of evaluating the spaces, it’s important to identify what’s seen as successful outcomes by the school to assist in reflecting on the spaces. The review of the prototype spaces could respond to the values and culture of the school community, creating an environment particular to its needs.

The evaluation of the spaces could focus on the development of relationships within the school between teachers, students and peers, the types of spaces, the educational activities and whether the space enabled or constrained the activities. These observations would inform the development of the architecture. This provides opportunity to fine-tune the design, ensuring that the new pedagogies being designed fulfil the needs and aspirations of the school community. It also allows the teachers the opportunity to experiment with the prototype, helping to unify the school community and gain buy-in from the teachers to the proposed changes. This could potentially assist with reducing resistance to using the new spaces and a smoother transition by students and staff post-occupancy.

fig 41: Dandenong High School Prototype, 2007, Mary Featherston Design. (Source: Mary Featherston Design) Learning areas and circulation (top), design drawing (bottom).
Tool pilot on Sandringham project
At Sandringham College the existing school was mostly traditional, general purpose classrooms, so the teachers had little opportunity to experience teaching in a wider variety of environments. The school had chosen the 3i pedagogy model, which they had seen working well in other schools they’d visited. After the completion of the masterplan by CHC, I suggested to Sandringham College that they could setup a prototype teaching space to trial the 3i education model that they were proposing to use in the new school design. For Sandringham, I also saw the prototype as an opportunity to trial other pedagogies and spatial arrangements, so the school could reflect upon these experiences and encourage the school to potentially identify a broader range of environments needed to facilitate its teaching and enrich the planning of the architecture (fig 42).

Sandringham thought the prototype was a good idea and they identified potential rooms at the Beaumaris campus that could be altered to create the prototype space (fig 43-45). The area to be adjusted was located in an existing light timber construction building from the 1960s, with the configuration of a corridor down the centre and classrooms either side. The existing spaces received a large amount of natural light and ventilation, via windows along the external wall and high level windows above the corridor space. The school selected three adjacent classrooms, store room and corridor to be altered to create the prototype space. The brief was to connect the spaces, but allow them to be subdivided if required. The layout of the area needed to accommodate spaces for the 3i’s – instructional, interdependent and independent learning. The school wanted to design the space with minimal alterations to the existing building. The prototype space would also largely use existing furniture, with funds potentially available for special furniture items.

During the design of the new spaces and the budget limitations, demolishing the wall between the classroom and narrow two-metre corridor was expensive in comparison to the gain in space. Instead I looked at a minimal intervention, of demolishing walls between existing classroom spaces to create connections between areas. This gave enough space to potentially accommodate three teachers and three groups of students, plus a discussion and reading area (fig 46-48). I saw the prototype as an opportunity to test not only the planning and use of the space, but the other spatial qualities and components of space. In her Wooranna Park Primary School, Mary Featherston describes the physical environment of schools as made up of layers. There is the design of the building, which is fixed, the furnishings that can be moved around and changed, and finally the loose items that the teachers and students bring into the space, which are frequently changed (Featherston and Newton 2010).
The Sandringham prototype provided an opportunity to test each of these layers. For the building layer, the prototype could test items such as its orientation, placement of windows and control of natural light. The acoustics of the space and how they’re managed through the treatment of surfaces to control the transfer of noise between areas in the open plan configuration. Also the finishes, such as the colour of walls and carpet. For the next layer of furnishings, the prototype could have trialled different types of furnishings and their location within the space, such as chairs, tables, bookcases, storage and pinboards. Lastly, the space could have been tested for the loose items layer, brought into the space by the teachers and students and what’s needed to accommodate them in the space.

fig 42: Prototype sketches for Sandringham College.
fig 43: Sandringham College existing building to be adapted into prototype space.

fig 44: Sandringham College existing classrooms to be adapted into prototype space.

fig 45: Sandringham College existing corridor to be adapted into prototype space.

fig 46: Sandringham College existing classrooms to be adapted into prototype space.

fig 47: Sandringham College prototype space with 3I pedagogy.

fig 48: Sandringham College prototype space with 3I pedagogy.
Prototype tool reflection

The Sandringham College prototype space I designed did not proceed to construction for a number of reasons. The prototype could not be funded as part of the DET building budget and needed to be funded by the school. The proposed rooms also contained asbestos, which needed to be removed before altering the spaces, requiring further expense. While Sandringham College was interested in the idea in principle, they didn’t appreciate the opportunities and value of the prototype space to proceed with the project when these hurdles arose. This can be a challenge as an architect to encourage the school to buy-in and appreciate the potential value of a prototype space. In the Dandenong High School prototype precedent, the school had support from the DET. This approach could potentially assist schools in the future implementation of the prototype, as the prototype testing could then be coordinated with more flexibility in the DET timeframes if they were on board with the idea.

Another value of the prototype tool is its ability to assist in bringing together the relationship between the school community, pedagogy and architecture by providing the opportunity to test and reflect on the implementation of the ideas and give them confidence in the design before it’s built. For the architecture, the prototype space allows the testing of the building design, internal furnishings and loose items. For the pedagogy, the prototype may have led to the identification of a greater variety of spaces beyond those needed for the 3i pedagogy and enriched the school’s education experience for students and staff. There are also benefits for the school community, through providing a space that not only the teachers and students can experience, but also the parents and prospective new students to the school. This manifests the ideas into the community and draws the whole school community into the design process, allowing them to experience and understand the implications of the design. This empowers the school community and allows them to more actively participate in the design process.
School design tools reflection

The school design tools were developed through reflection on my past practice and school community projects, identifying deficiencies within the school design process and recognising the importance of the development of the three key relationships through multiple approaches to school design. The school design tools facilitate the building of the relationships between the architecture, school community and pedagogy, assisting in bridging the gaps between the three poles by providing strategies and approaches to some of the recurring issues identified in the PhD research. The series of projects completed with Sandringham College allowed the exploration of these issues and the development of the suite of school design tools to be used in the school design process.

The school design tools represent a shift in my thinking of the role the architecture, school community and pedagogy play in the school design process. I believe that the architect can play a more active role through the use of the school design tools to develop the three key relationships and their capacity to effectively collaborate with each other. The school design tools facilitate the building of these relationships and roles through collecting and extracting information to develop the brief and allow the architect to evolve the information into effective school architecture (fig 49).

Architecture pole

For the architecture pole, the school design tools could have assisted in my past practice projects in a number of ways. An intention of the school design tools is to assist the architect in prioritising the collecting of briefing information into key areas, which can be evolved into architecture. This involves sorting the briefing information into items that can inform the architecture in material ways, such as planning or design, and those that can be reflected through immaterial ways, such as cultural practices of the school community or the practice of the pedagogy. This process allows the architect to then focus on key items that will manifest themselves in the architecture. Each individual tool – school identity, observation, communication, design intent and prototype – represents a key area of information to be collected. The school design tool loop describes the key areas of information needed in each loop and the tools that enable its collection. The loop process begins with the smaller loop, which focuses on the establishment of a brief developed via information collected through the school identity, observation and communication tools. The middle loop follows this process, with the addition of the testing of the design intent through the prototype tool. The outside loop builds on steps in the second loop through further design resolution, followed by construction.
fig 49: Mapping of school design tools on three key relationship diagram, November 2016.
Pedagogy pole

For the pedagogy pole, the use of the school design tools could have assisted in the development of Bendigo South East College. The school identity tool would have helped the school leadership team interpret the needs of its school community and provided confidence in the three key relationship diagram aspiration of committing to a pedagogy earlier in the design process.

The use of the observation tool at the existing Bendigo schools would have aided the three key relationship diagram aspiration of an understanding of the interaction between teachers and students within the space. This knowledge would have provided a greater awareness of the change to their teaching and learning through the intended open plan design and recognition of what a radical change it was and if the design could have been adjusted for an easier transition into the new spaces.

The communication tool would have facilitated a more interactive process between the architects and teachers at Bendigo South East College during design and assisted in their understanding of the design intent and the potential uses of the space, increasing the teachers’ and my own understanding of the relationship between architecture and pedagogy from the three key relationship diagram. Through empowering the teachers to be more involved in the design process, it may have resulted in less resistance and hostility to the new design.

The design intent tool could have assisted at Bendigo South East College through collating information from the other tools into a clear brief and translating it into the architecture.

The prototype tool could have given the school the opportunity to test and experience the open plan spaces and provide feedback to adjust the design, with the aspiration of achieving a better alignment in the relationship between the architecture and pedagogy in the new spaces, as well as addressing any concerns expressed by the staff.

The use of the school design tools enable a greater understanding of the issues in school design in my practice without the need to bring in an external consultant, as seen in the case study projects with FNI and Mary Featherston, who assisted in bridging the gap between pedagogy and architecture. The school design tools provide a looser framework for the design process than currently used in the procurement of DET school projects. The tools facilitate a process similar to that used by Hayball in engaging the school community in the collaborative design process and formalising that engagement through a structured way of working.
School community pole

For the school community pole, the school design tools could have assisted the RMIT architecture students in their projects through the loop process, prioritising and visualising the sequence of steps in school design. The students would have benefitted from focused work at the start of semester, researching the school identity and observation of the existing spaces before the workshop with the school. This would have allowed them to construct a more focused conversation with teachers and students and obtain feedback on more developed design ideas. The communication tool could also have added to the use of models as a communication device, assisting in providing a shared visual language through drawing techniques that record the discussion between architects and educators and connect the relationship between pedagogy and architecture and a record for later reflection on the discussion. The school design tool loop could have provided the students with a clear process and understanding of the key steps and information that would be useful in developing the design intent.

fig 50: School design tools aim to facilitate collaboration with the school community (all photos).
The *school design tools* could have assisted the school community in the development of the Facades Project to develop their school identity in the prebriefing process. Observation work was conducted during the development of the Facades Project and helped facilitate an understanding of how the existing school community operated and the most effective points of intervention. The *communication tool* could have assisted discussions with the school to develop the pedagogy and how it could inform the architecture. The *design intent tool* could have pulled all the tools together to create a clear project vision. The *prototype tool* could have been effective in assisting the school to trial pedagogies in new spatial arrangements before the final forms were committed to. In summary, the *school design tools* could have assisted in collecting further briefing information that would have filled in the information gaps during design. This project also reinforced the issues I’d identified as being important in my *three key relationship diagram* – the school community needs to have a commitment to agreed values for education and an understanding of the school identity with the community.

The *school design tools* provide guidance and direction for the architect and school community through a clear *loop process*, identifying objectives that need to be resolved before the next step can take place. This provides greater clarity on the role of each pole, as well as when and how it can effectively contribute in the school design process. The information collected through the tools is of reciprocal benefit to the school and the architect. The tools employ techniques such as observation, listening, reflection, communication, clarity and testing to discover new information to inform the school design process.

The tools assist the school in developing a leadership role in the development of their school identity and pedagogy. At Sandringham College, the school learnt from the information collected through the *school design tools*, providing the school with a different perspective and a new understanding of their school community. The *school design tools* benefit the architect through enhancing understanding of the school community and pedagogy, with a focus on how they can effectively inform and guide the school architecture. Through embracing the tools, the school learns about design and the architect learns about education.
The school design tools are about a design approach, rather than a particular aesthetic outcome. The design approach prioritises achieving a balance between the three poles in the school design process. They do not prioritise a particular process, but view the proposed process in this PhD as a device that evolves as the tools are used and, potentially, changes in response to the aspirations of specific projects. The suite of tools acknowledge the complexities of school design and the messiness of the process, suggesting different ways of working with the mess, rather than trying to organise it into a format we can understand and ignoring the parts we don’t understand.

The tools would work differently on each project, responding to the needs and issues of each school community. In this sense, the tools support a process, but process is not a function of the PhD. In my practice, the use of the school design tools assists in developing a deeper understanding of the issues in school design, with the aspiration of leading to a more conscious approach to designing effective school architecture.

fig 51: School design tools aim to facilitate collaboration with the school community (all photos).
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5.0 Conclusion

‘Schools are one of the most interesting and challenging areas for design today. Young people spend vital hours of their lives in them, they are the workplaces of many adults, they contain many relationships and huge expectations and they absorb vast resources. School buildings are very visible and tangible expressions of our attitudes to children and learning. Locally and internationally there is a growing consensus that traditional formulas for school and schooling - separate classrooms, minimally furnished and strung along corridors are no longer appropriate’

Mary Featherston. (Featherston Archive n.d. Designing from the inside-out).
fig 01: Three key relationship diagram, June 2012

Commitment to school values and intended role of school in community

Role of architect and architecture

Interpret school community values

Evolve pedagogy into architecture

Balance between school community, pedagogy and architecture

Commitment to a pedagogy

Interaction between teachers and students within space

Relationship between architecture and pedagogy

SCHOOL COMMUNITY

SCHOOL RELATIONSHIPS

ARCHITECTURE

PEDAGOGY
Reflection
Through the PhD I set out to research the concerns that were contributing to inconsistent architectural outcomes that I’d observed in my past practice work and within Victorian Government school design. More broadly, I sought to develop my understanding of these issues to facilitate a more conscious approach to the design of schools in my practice.

Three key relationships
The reflection work carried out early in the PhD and discussed in the Reflective Practice and School Procurement chapter, mapped out the collaborators in the design process of my schools. I identified three key relationships between the architect, school community and pedagogy, and the need for both a balance between them during school design and for each party to perform their role and contribute to the design process. This led to a shift in my thinking from viewing the development of schools from a procurement perspective to an understanding of the importance of the building of relationships between the collaborators and the impact this can have on the outcome of the architecture.

Poles
Through this work I came to recognise that each of these three key relationships have a different view of what a school is, and represent a range of divergent aspirations during school design. To reflect this I refer to the three key relationships as ‘poles’, which push and pull the school design process in different directions. The comparative analysis diagrams revealed deficiencies in the school design process, with aspirations for each pole in an ‘ideal’ collaboration process described in the early three key relationship diagram (fig 01). This diagram led to a shift in my practice, recognising that in order to facilitate the building of the three key relationships during the design process I needed to develop a new approach to how I design schools.
fig 02: Evolved three key relationship diagram, November 2016.
Developing school design tools
To develop the school design tools and understand the three key relationships, research was completed in each area in the Architecture, Pedagogy and School Community chapters, with each revealing further complexities in the relationships between the three poles. (fig 02).

Architecture pole
There was a shift in my understanding of the role of the architect in the school design process, and recognition of a greater need for leadership to facilitate the building of the three key relationships during design, and a balance in how they inform the architectural outcomes. I created the school design tools to assist with interpreting the school community and pedagogy poles, but more specifically to assist in articulating the concerns that can evolve to manifest in the architecture pole.

Pedagogy pole
I now understand there is a strong relationship not only between the architecture and pedagogy poles, but also the school community pole. The pedagogy builds on the history and culture of the school community and establishes aspirations for the future. For example, this can be achieved through an understanding of the aspirations for the interactions between teachers and students and the role architecture can plan in enabling this.

School community pole
I recognised that to develop architecture that responds to the needs of individual school communities, I needed to develop an understanding of their position. Schools often reinvent their school identity when designing a new school, and they may need to develop this through a pre-brief process so it can effectively inform the architecture. A role for the architect is to assist with how the school identity can be reflected through the experience of the pedagogy and represented through the visual culture of the school in the architecture.
fig 03: Reflection on people representing the three poles.

fig 04: Reflection on space representing the three poles.
Reflection on poles

My early three key relationship diagram (fig 01) shows an idealised view of a balance between the three poles. At the close of the Architecture, Pedagogy and School Community chapters I reflected on my initial observations and revised my aspirations for each pole. The evolved three key relationship diagram (fig 02) communicates my shifts in thinking around each pole and their interaction. Importantly, it recognises that each pole has a dependent and independent role to play in the school design process.

There is an independent role that recognises the importance of each pole’s subject area expertise. The architect can encourage and assist the school community in how this could inform the architecture. But ultimately, the school identity needs to be defined and owned by the school community. Likewise, the school community needs to evolve the school identity into the pedagogy, and the architect can assist in how this informs the architecture. The evolved three key relationship diagram shows a deeper understanding of where an architect can be most effective in the school design process and further articulates the poles of the school community and pedagogy.

The terms used for the three poles are broad, and they encompass further layers of complexity that have emerged through the research. Each pole is represented through relationships between people and space (fig 03-04). The architecture pole is lead by the architect, who also leads the school design process and designs the architecture. The pedagogy pole is largely represented by teachers, who represent the needs of the learning environment. Whereas the school community pole describes both the school community stakeholders and is represented through the design of the school site.
fig 05: School design tools mapped over three key relationship diagram, November 2016.
School design tools

In the School Design Tools chapter I describe a proposition for school design tools that provide a broader range of approaches to design than I’d used in my past practice projects. This was assisted by precedent research into design tools, which highlighted that some of the issues I’d experienced had been discussed by other designers and architects, who used varying approaches to the issues.

This led to a shift in the approach to how I design schools, moving away from the more traditional methods of drawings, communication and brief preparation commonly used by architects, to a more nuanced approach. Through the school design tools I advocate the need for multiple approaches to school design in response to the range of issues and deficiencies in the school design process.

Conceptually, the school design tools aim to build the three key relationships in the school design process and may assist in understanding each pole. However, the tendency for each tool to reveal particular types of information is acknowledged in the mapping of the school design tools over the three key relationship diagram (fig 05).
School design tool process loop

The school design tool loop (fig 06) describes the cyclical process of the use of the tools, with a three loop process that can be used within the traditional architectural project stages used in Victorian government school procurement. This diagram outlines the sequence of the tools and assists in communicating the aspirations for each loop before progressing to the next loop. Each tool is designed to work with a different issue in the school design process, and strengthen the capacity for each of the poles to effectively perform their role and collaborate with the other poles.

School design tools

My research has shown connections between the architect having an understanding of the three poles and the design of effective architecture. They work differently to school design methodologies I’ve experienced while working with other architectural practices. The tools provide the architect with strategies and approaches to work with the school to develop the three poles into concerns that can inform and guide the architecture. While developed for application in my own practice, the school design tools could be used to assist other architects in the school design process.

The school design tools work in three ways. Firstly, they assist in the development and balance of the relationships between the three poles of school community, pedagogy and architecture. Secondly, the tools focus the collection of briefing information into the five key areas of the school design tools, which my research showed to be important in the development of schools. Thirdly the tools enable reflection on the briefing information by the architect and empower the school to participate in the design process through clear communication and representation of ideas. This enables a deeper understanding of the needs of the school community, its pedagogy and how it manifests in the architecture. Lastly, the tools can assist with design, through the curation and prioritisation of the briefing information and how it can inform the development of the architecture. The tools have been developed and tested with an existing school community, with the intention they could be modified and adapted for use on other project types, such as green field sites through providing an approach rather than strict parameters (fig 07).
Reflection on use of school design tools

The reflection on the use of the school design tools on the Sandringham Project highlighted that the communication and design intent tools, which build on techniques commonly used in architectural practice, could be used within the current structured DET school procurement process. However, the articulation of the school identity by the school community and observation tools, would be more effective used as part of a pre-brief process before masterplanning, rather than running parallel with design. Likewise the prototype tool would be of most benefit during masterplan and sketch design phases, where the testing could occur and feedback into the design during design development.

This highlights the need for a pre-brief process within the current DET school procurement process, allowing the school time to start developing their school identity and pedagogy before design begins. Often schools receive very little notice or preparation time before the process of school design begins, which can leave some schools scrambling if they don't have a clear understanding of these issues.

The identity of the school community and pedagogy are different by nature, both having a shorter life span than architecture. The identity of the school community and its pedagogy may evolve every five years. In contrast, architecture is relatively fixed in nature, with schools in Victoria designed for a 30+ year lifespan.

The school design tools aim to assist with these types of conflicts, through recognition of the issues and a more conscious approach to how they could be addressed in school design. On the Sandringham Project the tools revealed issues that were then addressed in the design (fig 08).
fig 07: School design tool summary.
School identity tool

The *school identity tool* is designed for use with the school community. It aims to facilitate the development of the school identity and an understanding of how this could connect with and inform the architecture and pedagogy.

Observation tool

The *observation tool* is designed to develop an understanding of tacit knowledge, informing the use of space in the education environment.

Communication tool

The *communication tool* may assist the architect in working with the school community through bridging the knowledge and language gaps between the different disciplines of education and architecture, using visual representation beyond the traditional drawing types used by architects.

Design intent tool

The *design intent tool* aims to assist the architect in the establishment of clear objectives and a hierarchy of ideas to inform the architecture.

Prototype tool

The *prototype tool* allows the testing of new pedagogies and its relationship with space during the design stage, allowing the ideas to be refined before design is finalised for construction.
Contribution to knowledge

In reflection, my contribution to knowledge contributes to both an education agenda and architectural agenda. The contribution addresses the following core concerns in my research:

1. Identification of deficiencies in the Victorian school design process
2. Relationships in the school design process
3. Identifying the need for multiple approaches to school design
4. School design tools for the architect

The research has helped me gain a deeper understanding of the challenges and issues that were contributing to the inconsistency of architectural outcomes, where some of my schools were working more effectively and as intended, than others post-occupancy. The precedent and case study research has helped me understand different ways of designing schools and the development of my own approach through the school design tools. I have a greater understanding of the issues at play and an approach to assist in working through these, with the aspiration of creating more effective schools. The recognition of these concerns has charted a direction for the future of my practice.

Investment in public education and the quality of the architecture of our schools reflects our views of children and our values for their education. Our public school system should be viewed as offering all citizens access to a first class education. Schools are one of the few public buildings that children come into contact with on a daily basis, and they should be spaces that inspire children to learn.

For architects, schools represent a complex design challenge with great potential for architecture to lead and shape how future generations experience learning.
fig 08: Sandringham college school community hub combining canteen, and informal learning areas with social and outdoor areas.
Further research

This research has provided direction for my initial questions that prompted the development of the PhD, but has opened up a number of new questions and opportunities within the broader context of the way schools are designed and procured in the state of Victoria. Reflecting on this research, there are areas of investigation that would benefit from further research for incorporation into the school design tools.

There are clear challenges in understanding how to design effective schools, given the same pedagogy is interpreted and translated by different architects into distinctly different design outcomes. It’s also important to appreciate that the effectiveness of the architecture is dependent on the willingness of the teachers to use the spaces as intended, making it important to bring them on the journey during design. These factors play a role in comparing and evaluating what is effective school design and how to facilitate it. Further research in this area would benefit from collaboration between architects and educators. My research has been greatly enriched by the cross-disciplinary research between architecture and education, developing an understanding of the interaction between these two subject areas.

The design of the school landscape architecture and its potential as an important part of the whole site is an area warrants further research, with a lack of studies done in this area, for possible inclusion in the school design tools.

The school design tools have been developed through this research and based on my experience within the design of schools in the Victorian government sector, however, there is the potential for wider application to other sectors, such as independent and catholic schools, through adaptation and further research.
References
6.0 Exhibit

The PhD Research was presented at the RMIT Practice Research Symposium, October 2016. The exhibit includes wall panels divided into five parts. The centre panel includes the development of my understanding of the three key relationship diagram through the research. The surrounding panels represent the research on the architecture, pedagogy and school community poles, and how they informed the development of the school design tools. The presentation included two videos of interviews with architects, designers, educators and school leaders, representing each of the three poles. The videos capture the challenges for architects in designing schools, and the complexity between the three key relationships during the school design process and can be viewed online. (Source: www.vimeo.com/200114175)
Presentation of PhD at RMIT Practice Research Symposium, October 2016.
Video interviews with representatives of school community, pedagogy and architecture poles. (Source: www.vimeo.com/200114175)
Community green and landscape areas.
Drawings (Source: HASSELL)
Crusoe Secondary College is one of four schools that was developed in the Bendigo Education Plan (BEP), aiming to regenerate secondary schools in a low-socioeconomic area through a new approach to education. The school community had a range of social issues, with only 75 percent of students completing school and many from disadvantaged backgrounds of poverty and dysfunctional family structures. The new schools aimed to significantly improve student attendance, provide a greater range of educational opportunities and encourage effective teaching to improve the poor academic outcomes.

Crusoe Secondary College and Bendigo South East College were designed by HASSELL and combined three middle schools for years 7-10 onto two sites, creating larger schools that offered a broader range of curriculum and facilities. These schools were some of the first to be designed in Victoria under the Department of Education's new approach to school design that represented a shift from the traditional general purpose classroom to open plan spaces.

Being a new type of school in Australia, US education architects Fielding Nair International (FNI) were brought in to create the pedagogy and advise on its transformation into architecture. There was a long two-year design process before construction began, with extensive consultation with the school staff to inform the development of the project. The pedagogical approach to the school was controversial amongst the staff, with some reluctance to change teaching practice for the open plan spaces.

In the masterplan, the school is divided into a community use and school zone, separated by a community promenade circulation space. Within the school, the 1100 students are spread over four learning communities arranged around a central community green informal gathering space.

Each learning community houses a year level and is given a separate identity through association with a particular speciality such as design, creativity and technology, think and inquire, health, fitness and wellbeing and performance. Each learning community includes two large open plan areas for around 125 students, with Einstein studio breakout areas, staff workspaces, interview and meeting rooms. Each building also houses a Da Vinci studio, incorporating facilities for combining art and science subjects. Post-occupancy, it can be seen that spaces are used in a different manner to the design intent. The school has gone through a long process of learning how to effectively use the new spaces, and have been rewarded with a substantial improvement in student learning outcomes.
Learning community.
Drawings (Source: HASSELL)
Performance (top), Health, fitness and wellbeing (top middle), think and inquire (bottom middle), design, creativity and technology (bottom).
Community green and landscape areas. 
Drawings (Source: HASSELL)
Bendigo South East College (BSE) is the second school designed by HASSELL as part of the Bendigo Education Plan, with Crusoe Secondary College. BSE was located in a slightly more affluent area than Crusoe, but it still shared many of the same social issues.

Again, there was a long two-year planning phase, with extensive consultation with the school community. At times, there was scepticism and resistance from the teaching staff to support the proposed approaches to pedagogy, resulting in a challenging design process.

The school site also housed a large two-storey gym, which the school shared use of with the local community. The pedagogy of FNI also informed the planning, but was configured in a more open plan arrangement, with 300 students across four learning communities. It shares the same specialities as Crusoe - design, creativity and technology, think and inquire, health, fitness and wellbeing and performance. A year level is associated with a speciality, with a different colour giving each building its own visual identity.

The learning communities are grouped around a central community greens, however, there is a 20-metre fall from one corner of the site to the other, resulting in almost a two-storey drop between the upper and lower tier, breaking the sense of a whole school shared space.

Each learning community includes three large open plan areas for around 100 students, with a central Einstein studio, staff workspaces, interview and meeting rooms. The Da Vinici studio is centrally located for shared use by the learning community and is used in collaboration with the Einstein studio.

Post-occupancy, it’s taken the school several years to work out how to effectively teach in the new spaces, being such a radical transformation from the traditional classroom design. The school has now seen substantial improvements in student learning outcomes.
Learning community.
Drawings (Source: HASSELL)
Performance (top), Health, fitness and wellbeing (top middle), think and inquire (bottom middle), design, creativity and technology (bottom).
Year 9 learning centre.
Photos (Source: SJ Higgins)
Keysborough Springvale Regeneration Project combines four nearby schools onto two sites to create two larger schools, offering a broader range of curriculum and enhanced facilities. Y2 have 25+ years of experience designing schools and worked closely with the school to develop the pedagogical direction and the architecture. The design stage on this project was shorter, with consultation sessions held with the school. When this project was being designed, there were built examples of the DET’s new pedagogy and the school leadership team were on board with the new design directions, leading to a smooth design process.

These buildings are the first stage of the project, consisting of four learning communities across two sites for the Years 7-9 students. The single-storey Year 9 building is identical on each site, whereas the two-storey year 7-8 building is adjusted to fit the differing topography.

This school is developed from similar pedagogical approaches and key ideas to the Bendigo projects, but the design has evolved in a different manner. While the Bendigo schools had large open plan areas, the Year 9 building has smaller groupings in the open plan areas for 50 students, connecting to adjacent breakout spaces.

The plan of each of the four buildings is designed around a ‘learning street’, which reinterprets the traditional corridor circulation space into a wider space that hosts a range of informal learning areas, including a gallery and student cafe.

Like Bendigo, specialist spaces are grouped into a multipurpose space. In this case science, technology and art are combined into a room called the StART Studio. Post occupancy, the students and staff are responding very positively to the space and are seeing good learning outcomes.
Year 9 learning community (top).
Years 7-8 learning community (bottom plans)
Drawing (Source: Y2 Architecture)
Years 7-8 learning community.
Photos (Source: SJ Higgins)
Mt Egerton Primary School was developed as part of the National Building Economic Stimulus Package Building the Education Revolution (BER) program. It’s located in a small country town north west of Melbourne, with only 20 students.

The school received funding for a BER template building, but the school site was located on a hill, with restricted site access that was unable to accommodate a template building. Instead we designed a custom project of ‘additions and alterations’ to replace an existing portable that housed the school library.

The school had a picturesque Victorian schoolhouse that was retained, which included two traditional classrooms and a small administration area.

The pedagogy of the school was a vertical learning model of P-2 in one classroom and year 3-6 in the other. The time allowed for consultation with the school in the BER program was short, with minimal contact with the school community and limited opportunity for them to shape the project.

The architecture of the new building was designed to contrast with the existing heritage school building as a flat roof modern extension; however, this design concept was rejected by the school as being out of character with the traditional hip roofed buildings of the town. The design was changed to mimic the Victorian schoolhouse, with modern materiality. We renovated the existing classrooms and added a library in place of the administration area. The new building provides a transition locker area, glazed to bridge between existing and new, with a multipurpose room including cooking, wet area facilities and staff areas.

The BER process ran differently to other government schools, driven by the project manager with the architect’s role focused on the design and specification of the architecture.

For the school, it was a good outcome, with the school community benefitting from the BER funding with a permanent custom-designed facility in place of a generic portable building.
Existing siteplan (top). Proposed masterplan (bottom)
Drawing (Source: Y2 Architecture)
St Josephs College in Echuca is a Roman Catholic co-educational secondary college. The school was established in 1886 as part of the Brigidine Convent that still exists on the site. The small site is located in a residential area with a heritage overlay that restricts future land acquisition and expansion of the school. The densely developed site contains minimal outdoor areas and recreation spaces. The school has a strong relationship with the local community and uses the sports facilities at the nearby community gyms and ovals to subsidise their onsite facilities. The masterplan proposes the demolition of a small existing building in the middle of the site to create a sense of community within the school through the creation of a central shared outdoor space. The school has a full-height perimeter fence, separating its relationship with the community. The masterplan proposes the removal of the fence and the addition of a gym and performing arts centre, which has been located with a strong relationship to the street and visible street presence.
Drawing (Source: Y2 Architecture)
(Photographer: Zachary Couyant)
The Ballarat South Community Health and Learning Precinct is a P-12 school with facilities for the lifelong learning needs of the whole community and social infrastructure for the region. The project was developed in collaboration with local councils and government health and education departments, with aims to build a stronger community through breaking the cycle of intergenerational social disengagement in a low-SES area. In addition to the P-12 learning spaces, the site includes an early years centre, occasional care centre and maternal and child health, child family services parenting centre, community library, trade training centre, community hub, double gymnasium and 400mt athletics track. The school also generated links with charities, community and youth actions groups to provide additional support to disadvantaged students. The schools within schools (SWIS) vertical learning pedagogical model was chosen to improve the sense of community amongst the students through giving them a building home on each site they are associated with for the duration of their schooling. The primary site, housing years P-4 in the one learning community and the secondary site includes one Years 5-12 and three Years 7-12 SWIS learning communities. The site contains a number of existing buildings (blue) that have been retained and the integration of community and school buildings informed the site planning, with community facilities arranged for street access, and the core school buildings on the interior of the site. The building of the project is a long-term plan, as funding becomes available, with the project anticipated to be in five stages. Construction of the first two stages has been completed.
Drawing and photos (Source: Y2 Architecture)
The Croydon Maroondah Regeneration Project for Years 7-12 combines two schools onto a small site. The new buildings are two storeys to maximise outdoor areas and arranged on a crescent shaped contour line, with the land falling away steeply behind the buildings. This focuses the campus to a central community green, acting as a social, informal learning and recreation hub for the school. The pedagogy groups students into learning villages for junior Years 7-9 and senior Years 10-12 for social and learning activities. These villages allow students to be taught in year levels or through vertical learning across the three years. Within the community green, junior and senior areas were created adjacent to their respective learning villages, creating connections between indoor and outdoor space. The villages are for general learning and are associated with a speciality. The junior years with music and performance and the senior years with art, science, and technology. The admin, food technology and library is located centrally and the gym is grouped with the outdoor sports facilities. The site contains a community theatre that was donated to the school and renovated to become the music and performance building. The project was designed and documented in 2010, with the funding for construction withheld when there was a leadership change in the Victorian Government. However, the school is now under construction.
Drawing and photos (Source: Y2 Architecture)
Library, administration and food technology building (all photos). Drawing and photos (Source: Y2 Architecture)
Mt Ridley P - 12 College

Years P - 12
Mt Ridley, Victoria
Y2 Architecture 2009 - 2015
$20m

Mt Ridley P-12 College is located on a greenfield site in a suburban growth area north of Melbourne. The P-4 primary school and Years 5-12 secondary school are located across the road from each other and designed as one masterplan. The project was planned to be constructed in six stages, as funding became available, and I worked on the secondary school buildings in stages 3, 4 and 5. These included the library administration and food technology building, the Year 9 learning centre, science technology and visual arts and the Years 10-12 learning centre. The school encouraged community use of the school facilities, with the PE performing arts and library buildings located near the street with parking, as well as other school buildings deeper in the site. Accommodating community groups informed the relationship of spaces within the buildings, with the library building zoned into public and school access spaces so the school could hire out the 150-person lecture theatre or library. The pedagogy grouped year levels across the site in learning centres of P-2, Years 3-4, Years 5-8, Year 9 and Years 10-12, with separate speciality buildings.

The style of the buildings is similar across the sites, with a consistent material palette. A different colour is allocated to each building to give it a different visual identity applied internally and externally. The library building is the contact point for visitors and the school chose to signify this through the application of the school colours, blue and orange, highlighting it as a main building on the site.

Awards
2009 Finalist Best Primary School VIC School Design Awards
2010 Finalist Best School Project VIC School Design Awards
Library, administration and food technology building (top)
Science, technology and visual arts centre (middle)
Years 10-12 learning centre (bottom)
Drawing and photos (Source: Y2 Architecture)
Year 9 learning centre (top).
Science, technology and visual arts building (bottom).
Photos (Source: Y2 Architecture)

Years 10-12 learning centre.
Photos (Source: Y2 Architecture)
Drawings: H Borland
Preshil

Ages 5 - 11
Kew, Victoria
Kevin Borland 1962 - 1972

‘Preshil is a unique and loved learning environment, architecturally innovative yet suburban, playful and modest and it remains largely as it was built in the early- to mid-1960s when Kevin Borland’s practice was commissioned to design the school hall and other classrooms. In 1972, Borland was awarded the RAIA Victorian chapter Bronze medal for the school campus, which encompassed six buildings designed between 1962 and 1972, including the octagonal school hall and various classrooms, such as the elevated long room building with a tree growing through the timber deck, and the multilevel and cellular-planned home rooms (John Kenny assistant architect, 1972).

Borland remained closely associated with Preshil as architect and parent for many years, and the school has had many other architect-guardians from among its former students or involved parents.

Preshil is a small non-government primary school of around 140 students. It was founded on progressive educational principles, with links to the ideas of AS Neill, the Montessori and Reggio Emilia systems, which steer a path towards lifelong learning that is essentially child-focused. The assumption is that children are reasonable people who should be fully involved in the decision-making of the school community and environment’ (Lewi 2011 para 2-4).

Awards
1972 - RAIA Victorian Architectural Medal Building
1962 - 72 Preshil buildings collectively
Memorial Hall, Senior school, plan and section, 2005.
(Source: Peter Elliott Architecture + Urban Design)

Grimwade House, junior school, master plan, 2005.
Drawings (Source: Peter Elliott Architecture + Urban Design)
‘Founded in 1858, Melbourne Grammar School is one of the oldest denominational schools in Victoria. The South Yarra site is well known, with its fine collection of 19th century bluestone buildings set in generous and picturesque landscaped grounds. The campus is subject to a complex range of planning and heritage controls, including some 25 buildings and landscape elements listed on the Heritage Victoria Register.

The memorial hall has been extensively refurbished and extended to provide facilities for music and the performing arts, as well as general school use. New accommodation includes a significantly expanded basement for storage, back-of-house under stage areas, a music studio and rehearsal space, as well as improved stage size and drama performance facilities. Given severe site and heritage constraints, most of the new space has been provided underground, except for a modest addition to extend the stage and wings. A new terrace has been created adjoining the hall cloisters, thereby improving the western setting of the building. Beneath the terrace lies the music studio and rehearsal space. This is accessed via external stairs down to a recessed courtyard, which also provides access to daylight and views into and from the underground studio. All underground spaces link back to the main hall and back-of-house facilities, providing a fully integrated music and drama complex’ (Elliott, 2016, para. 1,3,4).

Awards
Elliott - Memorial Hall:
2006 - RAIA Institutional Award
2006 - RAIA National Lachlan Macquarie Award - Heritage Wardle - Nigel Peck Centre for Learning & Leadership:
2008 - AIA William Wardell Award - Public Architecture
2008 - AIA Victorian Architecture Medal
2008 - AIA Emil Sodersten Award Interior Architecture
2006 - AIA National Award Public Architecture
‘Masterplanned in 2008 for a long term enrolment of 450 students, the school has been designed as three learning communities, each to accommodate 150 multiage students from P - 6. It was clear at the outset that this school was going to be different from all others, with the focus to move completely away from formal classrooms to a range of spaces for different activities and learning styles in a multiage environment. Personalised learning, peer-to-peer collaborative learning and team teaching all influenced the architectural design of physical learning spaces. The embedding of technology in the learning space – smart boards, networked and wireless connection to computers handheld devices adds to the flexibility demanded by the curriculum. Students are grouped ‘stage not age’, increasing engagement, they are taught to take increased responsibility for their learning.

As a result of the larger footprint of the learning space, particular attention in the design was given to increased natural light and ventilation and acoustic treatment. The raised roof and electronically operable windows allow natural light and ventilation to penetrate the centre of the building. Acoustically, a high degree of sound insulation, angled walls and sound absorbent materials ensure the minimum of disruption in the learning space. Internal spaces lead directly to landscaped outside learning areas protected by large covered eaves and provided with shade trees and seating’ (A4LE, 2014, para. 3, 4-6, 10-12).

Awards
2010 CEFPI International Award Project of Distinction for Elementary School
2010 CEFPI Australasian Region Award for New School Construction
Drawings and photos (Source: Scuola communale dell’Infanzia brochure, Reggio Emilia Study Tour 2013).
‘Designing the space of an infant-toddler centre or preschool, or perhaps we could just say designing a school, is a highly creative event, not only in terms of pedagogy and architecture but more generally in social, cultural and political terms.

The scholastic institution, in fact, can play a very special role in cultural development and real socio-political experimentation, to the extent that this moment (designing) and this place (the school) can be experienced not as a time and space for reproducing and transmitting established knowledge but as a place of true creativity...

Now is the time to create this symbiosis between architecture, pedagogy and the other disciplines in order to find better spaces, more appropriate spaces. We are not searching for an “ideal” space, but one that is capable of generating its own change, because an ideal space, an ideal pedagogy, an ideal child or human being does not exist, but only a child, a human being, in relation with their own experiences, times, and culture.

The quality of the space can therefore be defined in terms of the quantity, quality, and development of these relationships. Ensuring the existing and flow of this kind of quality is the primary task of relational pedagogy and architecture’ (Rinaldi in Malaguzzi, Zini, & Ceppi 1998, p. 114-115).
References


Harrison, S. 2009, ‘Blueprint for a Revolution, *Architectural Review Australia*, No. 113 pg 64-75


