Graduate Teachers and ICT: The Prospect of Transformative Integration

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Abstract

This study is concerned with the enactment at the school level of policies that promote the transformation of learning and teaching through the integration of information and communications technologies (ICT) into schools. The study has a particular focus on how graduate teachers, drawn from a highly digital generation, enact their practices.

In an ethnographic study, the ICT-based pedagogical practices of five graduate teachers in their first or second year of teaching were examined during one school year, to identify what factors influenced their pedagogical choices related to integrating ICT and the extent to which their practices were transformative.

The study was set in a school ‘in the middle’ - an Australian metropolitan secondary school that was neither technology-rich nor technology-poor, that scored good, but not outstanding academic results, and that did not experience any particular measure of disadvantage.

This study reconceptualises the integration of ICT by graduate teachers as a ‘wicked’ problem – one that is messy and complex and for which there is no single, easy solution. The study identifies three intertwined domains of factors – external, individual and socio-material domains – that mediate the pedagogical choices made by teachers when integrating ICT.

Within the individual domain, the study shows that teachers’ beliefs and dispositions towards ICT integration are influenced by their folk pedagogies or experiences as learners themselves; the pedagogies they were explicitly taught in their teacher preparation; the signature pedagogies and culture of the disciplines into which they teach; and the built pedagogy, the physical spaces in which they teach.

A socio-material perspective is shown to be essential when integrating ICT into school classrooms. The practices of the more experienced teachers have a significant influence on the pedagogical choices made by the graduate teachers, particularly when teaching out-of-field, and reveal a tendency towards reproduction rather than transformation of practice. However, the material world of the school and the local translation of policies, the little things, also have a significant influence on the pedagogical choices made by graduate teachers when integrating ICT.

With so many factors shaping graduate teachers’ practices, the study discusses the prospects for transformative integration of ICT by graduate teachers, revealing that, although the socio-material world of the school tends towards reproduction rather than transformation of practice, graduate teachers exert agency in their pedagogical choices. The study identified three categories of agency among the study participants – those who deliberately adopted the
dominant practices of their more experienced colleagues, those who reluctantly adopted such practices, and those who actively resisted the dominant practices. A fourth category is also suggested – the active transformer.
Declaration

This is to certify that:

i) the thesis comprises only my original work towards the degree of Doctor of Philosophy

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

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

Nicola Carr
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A PhD is an incredible and difficult journey, with high points and low points. It is also, at least in this case, a long journey. There are therefore a lot of people who, along the way, have added their advice, their knowledge, their ideas and their critique to this journey. I want to thank all of them, but in particular my final two supervisors, David Beckett and Nick Reynolds, who pushed me to places I didn’t think I could go. I would also like to thank my colleagues, past and present, who have encouraged me, supported me and at times badgered me into completing the thesis. In particular my neighbor, Michael Crowhurst for throwing theory at me at critical moments, Di Siemon for the fruitful discussions in the car, Julie Faulkner for the constant reassurance, Gloria Latham for just being her wonderful self, Annette Gough for holding my hand when all seemed doom and gloom, and Jen Elsden-Clifton and Rachel Patrick, for giving me brutal reminders about priorities.

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Some elements of Chapter 7 in this thesis will appear in the following publication:

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Chapter 1 – Introduction

1.0 Context and rationale

I don’t get it. The teachers had all this technology available to them but they didn’t really use it to the best of its advantage. It was usually just used to project things up onto a screen. I rarely saw it used beyond web searches or PowerPoint presentations. I think that ICT could be used in much more interesting and engaging ways at school. It was all about the teachers using it. Why don’t they get the students to use it?

The teachers in my school weren’t really familiar with using technology. They kept having to get the students to help them make things work. But I also think many teachers didn’t feel the need to resort to using technology because their more traditional methods felt more familiar and comfortable to teach.

It seemed like they were put off by the hassles that often go with using technology.

But I worry that those teachers who openly mock technology and admit that it is beyond them are sending the wrong message. They’re essentially saying, "it's too hard, I can’t do it, the computer had a vendetta against me, etc." This is not a positive role model for kids or a healthy culture to feed. What also concerns me is that it’s not necessarily the older teachers who respond like this. I’m always surprised to find young teachers with a similar fear of technology. Why?

Why indeed? These were comments and questions from a group of students undertaking their secondary teaching program in a class discussion immediately following a professional teaching placement. They were de-briefing about a range of issues they faced whilst in schools, and how information and communications technologies (ICT) were being used, or not used, was a hot topic.

I am a lecturer in teacher education at a tertiary institution in the state of Victoria, Australia. My official and somewhat lengthy title is Lecturer, ICT and Interdisciplinary Learning – which means that I am the person within a relatively small school who knows about ‘computers and stuff’. At least my colleagues think I do – I prefer to think of my skills as understanding enough about ‘computers and stuff’ in combination with pedagogy to see their potential to engage students and enhance their learning experiences, when used in appropriate ways. I also know enough about computers and stuff to realise that using them in the
classroom can be highly ineffective and does not always lead to better learning and teaching, however better might be defined. I also like to think I can instill this insight into my pre-service teaching students. When I commenced this study I was relatively new to this role of lecturer and most curious to see whether what my colleagues and I did with information and communications technologies (ICT) in pre-service teacher education programs makes a difference in the classroom.

On another level, I hear stories from my students, like those above, about the lack of use of ICT in the classrooms they are assigned to when on their practical teaching placements. These reports trouble me. In one role or another I have been involved in the educational use of ICT for over fifteen years and I am disappointed at how few schools, particularly secondary schools, seem to have effectively integrated ICT. The stories my students tell give me the impression that if ICT is used, it is used to do the same old things – word process essays and assignments, use the Internet for finding information, or give PowerPoint presentations instead of A3 cardboard projects. Most of my students see little evidence of more innovative uses of ICT that enable teachers and students to do things they otherwise couldn’t do in the classroom.

The intersection of curiosity about the effects of my own teaching and frustration with the seeming lack of progress in an area I have been involved in for nearly two decades seemed like a compelling area to situate myself in for a PhD.

Conversations like those by my students highlight the inconsistent uptake and integration of ICT into classrooms. Whilst these are anecdotes drawn from pre-service teaching students’ personal and often limited experiences, they echo findings presented in a range of literature about the failure of education systems to make the most of ICT in the school classroom. Since the mid-1990s governments and education systems around the world have made substantial and continued investments in equipping schools with ICT in the belief that it has the potential to transform education. However, despite this investment, schools, by and large, have not realised the transformative potential ascribed to ICT. Instead, use of ICT has largely been overlaid onto traditional, teacher-centred pedagogies, rather than bringing about the much-heralded transformation. Use of ICT in ways that transforms learning and teaching is patchy rather than widespread or systemic.

Successive governments across Australia, at national and state levels, continue to develop and implement policy initiatives aimed at integrating ICT into schools. Whilst many of the policy initiatives are focused on provisioning ICT equipment and infrastructure to schools, more
recent iterations of government policy are focusing on the role of the teacher in the integration of ICT. More recent initiatives, such as Teaching Teachers for the Future (2011), highlight the role of early career or graduate teachers and place greater emphasis on ensuring teacher preparation programs equip graduating teachers with the necessary knowledge about how to use ICT effectively to enhance and transform learning and teaching. Teachers and teacher educators are positioned as the problem in debates about the ineffective take-up of ICT, portrayed as technology-resistant or reluctant, or not using the right sort of pedagogies that get the most out of ICT. That is, teachers are not changing or transforming their practices in ways that realise the much-heralded potential of ICT to learning and teaching – they are the problem.

Mark Prensky (2001) argued that this will change naturally as the current generation of teachers, whom he terms ‘digital immigrants’, reach retirement and are replaced by the new generation of ‘digital native’ teachers. Prensky’s argument is that the ease with which members of this generation use ICT in their personal lives will somehow translate into effective use in their professional practices. Prensky’s message has had significant impact, permeating policy and gaining currency within education circles and setting up expectations about the capacity of recently graduated teachers to, in effect, solve the problem of ineffective integration of ICT.

Yet assumptions about graduate teachers’ abilities to effectively integrate ICT may be flawed. They assume a homogeneity that may not exist in reality, that is, that all graduate teachers share high-level competencies in using ICT. Further, it is assumed that graduate teachers’ competencies in using ICT in their personal worlds will seamlessly translate into using ICT effectively in their professional worlds. Such assumptions also seem to oversimplify the process of integrating ICT into pedagogical practice and ignore the complexities of teaching, and particularly the complexities facing newly-graduated teachers as they develop their pedagogical practices and their identities as teachers. Teaching is a complex practice that takes place in diverse settings, with a diverse range of people and things that can affect that practice. A deeper understanding of these complexities is may throw light on why successive policies achieve far less than is expected.

1.1 Study aim

History shows us that changes in education are often slow to be realised and that most efforts at educational reform, embodied in current policies such as those centred on ICT integration
in schools, ‘never have the impact they purport to produce’ (Fullan, 2011, p. 5). Substantial public funds continue to be invested in initiatives aimed at facilitating the integration of ICT into schools despite limited returns on that investment in terms of transformations to learning and teaching. Efforts to date to encourage existing, experienced teachers to use ICT more effectively to enhance learning and teaching in secondary schools have been met with mixed success, despite continued allocation of funds for teacher professional learning. A new emphasis in policy on the role of the graduate teacher is emerging, with new initiatives aimed at ensuring graduate teachers are appropriately equipped with knowledge about how to effectively integrate ICT when they graduate from their teacher preparation programs. That is, graduate teachers are now being positioned as a significant part of the solution to the problem of ineffective integration of ICT and positioned as being more likely to use ICT in ‘effective’ ways.

Reliance on policy responses without fully understanding how graduate teachers develop and enact their ICT practices once they arrive in a school may be met with similar mixed results to past policy initiatives. The primary aim of this study is therefore to enrich our understanding of how graduate teachers develop and enact practices for the transformative integration of ICT into their classrooms, in other words, identify what acts on graduate teachers to shape their pedagogical practices in relation to ICT. It attempts to uncover more about how graduate teachers develop practical knowledge around integrating ICT into their classroom pedagogies and about what influences their choices of pedagogies and ICT. In doing so, this study also examines the connections between practice and identity.

To that end, the study examines ways in which the social and material arrangements and technologies interact in the development of graduate teachers’ pedagogical practices that integrate ICT, and in the development of their teacher identities. It examines how graduate teachers develop and apply their pedagogical practices, specifically those that involve the integration of ICT in the early stages of their career. It also aims to ascertain whether graduate teachers have the capacity to integrate ICT in ways that result in a transformation of practice.

The central research questions this study aims to investigate are:

How do beginning teachers’ ICT-based pedagogical practices come into being through experiences in their early years of teaching?

What are the prospects for transformative practice in the integration of ICT?
1.2 Methodology

This is a small-scale study that examined in detail the experiences and practices of five graduate teachers as they journeyed through their first or second year of teaching in a single, metropolitan secondary school. The graduate teachers ranged in age from 23-34 years and in their ICT abilities and propensities to integrate technology in their own learning and teaching. Ethnographic fieldwork for the study centred on the observation of these five teachers as they went through their normal working days, supplemented by interviews, both formal and informal, to examine what the graduate teachers bring with them to teaching - their ideas about where ICT fits into their teaching practice, their skills and knowledge in using ICT - and how the social and material world of the school influenced their approaches to using ICT in the classroom, that is, their ICT-based pedagogical practices. A small number of more experienced teachers, comprising those in leadership positions within the school as well as other teachers who worked closely with the graduate teachers, also participated in the study.

This study took place in a large, metropolitan secondary school, selected because it had no discernible characteristics that made it special. By this I mean it was not a school with advanced technological capabilities; it was not a school with a reputation for particularly innovative teaching and learning approaches; it was not a school that was classified as disadvantaged. Indeed, RiverValley Heights High School (a pseudonym) was selected as the site for the study because it was a school ‘in the middle’, a typical school that was juggling the multiple demands placed on schools in the early part of the 21st century.

Definitions

Graduate teachers were the prime focus of this study. A graduate teacher in the Victorian education system was defined at the time of this study as a recently graduated teacher with between 0-4 years teaching experience. A graduate teacher in their first year of teaching is referred to as a first-year out teacher; a graduate teacher in their second year of teaching is referred to as a second-year out teacher, and so on.

ICT refers to information and communications technologies. For the purposes of this study, this is taken to mean a diverse range of technological tools used to create, store, manage and disseminate information. Such tools vary as technology makes rapid changes. At the time this study was undertaken ICT included computers (desktops and portable computers such as laptops and netbooks), computer networks, mobile phones, digital cameras, web cams and video cameras, peripherals such as audio recording devices, printers, as well as the network infrastructure that supports communication between devices. ICT also refers to the Internet.
and the range of online tools and environments that form part of the Internet, as well as the software that runs on the various tools.

Definitions of pedagogy, pedagogical practices and ICT-based pedagogies are developed in Chapter 2 in the context of examining literature related to these ideas. A Glossary is provided at the end of this document that provides definitions of other specialist terms that appear within this thesis.

1.3 Significance of the study

The study will provide new insights into reasons why policy initiatives aimed at facilitating the integration of ICT into school classrooms continue to fall short of expectations, by providing a richer understanding of the complexity of the issues involved. It adds to our understanding of the complexity of graduate teachers’ lives and offers a contextually situated portrayal of their workplace learning.

The study should provide a new way of conceptualising the factors that mediate and, at times, constrain the choices graduate teachers make about how their ICT-based pedagogical practices are enacted. Whilst the study focused specifically on secondary school, the model or framework has application beyond school settings.

The insights developed in this study may inform the development of policy and, importantly, provide those responsible for translating and enacting policies related to ICT integration at the school level with a richer understanding of the issues and factors that need to be considered. Also, there are important implications for teacher education institutions.

1.4 Overview of the study

Chapter 2 critically examines current policies and literature around ICT integration in schools to set the broader context for the study. The first part of the chapter focuses on policy expectations – what is explicit and implicit in a range of current Commonwealth and State government education policies in relation to the transformative potential of ICT in school learning and teaching. The second part of the Literature Review examines how practice is viewed through a range of theoretical lenses and will describe a set of characteristics of practice. It also examines the relationship between the enactment of practice and identity formation. This Chapter draws on current literature to attempt to define what is meant by transformative ICT-based pedagogical practices. Models of what contributes to ICT-based
pedagogical practices and how teachers develop their practices are also critically examined.

**Chapter 3** outlines the nature of my particular study, one that is situated within a specific context, examining in rich detail the experiences of a small number of graduate teachers within the context of a single school. It describes the year-long ethnographic case study approach taken, and why this approach best suited the aims of the study. It also describes how the site for the study was selected and how the research participants were identified. It outlines the nature of the data collection - through interviews, observations and examination of selected artefacts. This Chapter also describes how data was analysed and identifies ethical considerations that arose in the context of the study. The Chapter emphasises how this study is not setting out to prove anything, but to richly describe a specific context in detail that may help us to understand the ways in which practices, in particular, ICT practices of newly-graduated teachers emerge.

The findings and analyses are presented in three short chapters. **Chapter 4** begins with a more detailed description of the site of the study, RiverValley Heights High School, to provide an insight into the context in which the graduate teachers are situated. This Chapter shows how materiality such as the geography of the site, the distribution of the ICT resources across the school, the physical attributes of the teaching spaces, the local school policies and leadership shaped the integration of ICT by the graduate teachers.

**Chapter 5** presents findings and analysis about the approaches to teaching and integrating ICT taken by the more experienced teachers at the school. The findings are drawn from analysing the perceptions about how the more experienced teachers at RiverValley Heights integrate ICT from three different stakeholder groups – those in leadership positions, some of the more experienced teachers themselves as well as views from the students.

In **Chapter 6**, I turn to examine more closely that ICT-based pedagogical practices of the graduate teachers themselves and the micro-level factors that helped to shape those practices such as the graduate teachers’ beliefs about learning and teaching and the role that ICT might play in that. I present the graduate teachers’ views of their own skills and confidence in using ICT as well as highlighting how they made use of ICT in their own teaching practices.

Following a discussion of key themes arising from the findings of the study, **Chapter 7** outlines a new model of factors that influence the ICT-based pedagogical practices of newly graduated teachers and how these factors contribute to the development of practical knowledge about the integration of ICT in their teaching practice.
Chapter 8 presents conclusions that are derived from the study findings and relates these to the research questions upon which the study is based. Implications and recommendations for policy makers, schools and for teaching practice are also outlined. This chapter also identifies the limitations of the study and implications for further research into how ICT-based pedagogical practices are shaped.
Chapter 2 – Literature review

2.0 Introduction

This Chapter examines the literature in four broad, interrelated and, at times, overlapping areas.

First, it examines expectations that are generated about teaching practices from policies relating to integration of ICT into schools. Policies provide a macro-level context in which schools and teachers operate. In a sense, they provide a set of expectations about what will happen in schools. Examining the policy environment is important to set a context in which teachers enact their practices and to identify what expectations are in place within policy for those practices.

Second, the literature around the notion of digital natives is also examined. The current generation of learners is sometimes positioned as being different from previous generations as a result of their deep engagement with ICT, leading to calls for teaching practice to change to accommodate ‘new’ learning approaches. Newly graduated teachers are also positioned by some in the literature as being members of the digital native generation and therefore able to use technology in their practices in ways that current teachers have not been able to.

This study is essentially a study of practices – the ICT-based pedagogical practices of a small group of recently graduated teachers in a secondary school. It seems important to define what practices are and how they develop. The third section of this literature review therefore focuses on the theoretical explanations of professional practice and how such practices develop.

The fourth and final section of this Chapter narrows the focus to teaching practices specifically, looking first at normative accounts of teacher development, then discussing alternative views of how teaching practices, particularly pedagogical practices, might develop. But since this is a study of the ICT-based pedagogical practices of graduate teachers, I also discuss the literature around ICT-based pedagogy, examining what the literature says about pedagogical practices that support the integration of ICT, and discussing different models and frameworks that attempt to explain such practices.
2.1 Policy
This section examines the expectations about the integration of ICT in school education that are implicit and explicit in current Australian and Victorian policies, as a way of examining the macro-level context in which graduate teachers are situated.

2.1.2 Policy expectations
Since the mid-1990s governments and education systems around the world have made substantial and continued investments in equipping schools with ICT and its teachers with ICT skills based on the belief that:

Information and communication technologies (ICT) have the potential to transform all aspects of school education and contribute to the achievement of all learning goals. (Department of Education Employment and Workplace Relations, 2009, p. 8)

Millions of dollars have been allocated in ICT-related initiatives for the schools sector in successive annual budgets in Victoria alone between 1998 and 2010. Major initiatives announced in successive budgets in this period have focused on providing:

- schools with computers
- broadband internet access
- laptop computers for teachers and principals
- wireless networks across schools
- online resources for students and teachers via contributions to national ICT initiatives such as EdNA and The Learning Federation
- funding for technical support to schools

The Victorian Government has also provided professional development for teachers and funded projects that foster innovation in the use of ICT in classrooms and, more recently, has developed and rolled out the Ultranet, a standardised intranet and learning management system for schools with a budget of $118m. Other state governments around Australia as well as non-government sectors have also invested heavily in ICT initiatives for schools for over a decade. Under its Digital Education Revolution policy (Department of Education Employment and Workplace Relations, 2010) the Australian Government plans to invest $2.4b over seven years in support of ICT initiatives in schools.

Initially the policy impetus for integrating ICT into school education was based around a vocational and economic rationale in the imperative to prepare future citizens for a life of
high-skill, high-technology work (Bigum, 1997; Ham, 2010; Voogt & Knezek, 2008). The underlying belief was, and still is, that it is essential for nations to secure their ongoing economic development by developing the technological skills of its workforce (Convery, 2009) and the digital literacies of its citizens to flourish in an increasingly technology-rich and information-rich society (Voogt & Knezek, 2008). The rapid and sustained growth in the adoption of ICT in almost all areas of society dictated that education systems produce technologically-skilled citizens:

The capacity to manage, share and create knowledge is fundamental requirement for Australia’s prosperity in a global economy…school education plays a fundamental enabling role in the growing information economy. (Education Network Australia, 2000, p. 2)

In addition to arguments about the imperative of acquiring digital technology skills necessary to be a productive member of society in the information age, ICT was and still is heralded as having the potential to transform teaching and learning from industrial-age paradigms to those more appropriate to supporting the growth of a knowledge economy (Education Network Australia, 2000; Ham, 2010; Kalantzis & Cope, 2001; Mishra & Koehler, 2006; Voogt & Knezek, 2008). Early proponents of the potential of ICT to transform learning such as Seymour Papert (1996), provided a different impetus for ICT integration than that provided by policy, one grounded in theories of learning.

The following section examines relevant school education policies at the national and state levels.

**Overarching policies on ICT in school.**

The Melbourne Declaration on Schooling (MCEEDYA, 2009), agreed to by all education sectors, State and Commonwealth Governments, sets an overarching direction for Australian education, and reflects the policy imperative that remains around ICT in schools:

Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade. (MCEEDYA, 2009, p. 5)

The current Australian Government continues to position ICT as a driver of educational
reform and transformation and emphasises the role of teachers in bringing about this technology-driven change. In its Digital Education Revolution policy it aims to invest in ICT:

- to bring substantial and meaningful change to teaching and learning in Australian schools. It will prepare students for further education and training, jobs of the future and to live and work in a digital world...to support systemic change to increase the level of ICT proficiency for teachers and school leaders across Australia to embed the use of ICT in teaching and learning. (Department of Education Employment and Workplace Relations, 2010)

The Digital Education Revolution Roadmap (Australian Information and Communication Technology in Education Committee, 2009) lists as one of its guiding principles that “teachers and educators require the pedagogical knowledge, confidence, skills, resources and support to creatively and effectively use online tools and systems to engage students” (p. 6). Therefore, within these policies teachers are central to educational transformation through the integration of technology.

The view of technology as a teaching and learning tool is also explicit in recent policies for public education in Victoria. Recent policies emphasise the importance of the integration of ICT across the curriculum, as encapsulated in the Blueprint for Education and Early Childhood Development (Government of Victoria, 2008) which continued previous policies’ emphasis on “unlocking the full potential of ICT” (p. 25). Similarly:

ICT has transformed the way we think about education and it will continue to be crucial as we build a culture of innovation in Victoria. It is important that we use ICT in ways that enhance learning outcomes for students. (Dixon, 2011 p. 20)

**ICT in school curriculum policies**

What is taught in schools is guided by curriculum policies at both national and state levels. At the national level in Australia, *The Australian Curriculum* (Australian Curriculum Assessment and Reporting Authority, 2011) guides what is taught in state education systems and schools. The rationale for the emphasis on ICT competence in *The Australian Curriculum* is partly based on the large claims that:

Increasingly, ICT permeates every area of our society and lives. Students need to be equipped with the necessary knowledge and skills to use ICT to support contemporary learning and living. ICT affords the opportunities to personalise
learning and to learn both within and out of school…ICT provides tools for transforming the way students think and learn as they support risk-taking and knowledge sharing; they are fast and automated, are interactive and multimodal and they also allow students to control how and when they learn. (Australian Curriculum and Assessment Authority, 2011, para. 2)

The Victorian Essential Learning Standards, Victoria’s curriculum-framing document that guides what is taught in Victorian schools, expects teachers to embed the use of ICT in their curriculum so that students are provided “with the tools to transform their learning and to enrich their learning environment” (Victorian Curriculum and Assessment Authority, 2009).

ICT is seen as an interdisciplinary domain of learning, integrated into more traditional disciplines of learning in ways that allow student to develop new thinking and learning skills, to express themselves in more contemporary and socially relevant ways, and to communicate locally and globally.

The companion policy, Principles of Learning and Teaching, which is intended to guide teacher practice in Victorian Government schools, states that teachers need to incorporate “contemporary technologies into learning sequences in ways that are meaningful for students.” (Department of Education and Early Childhood Development, 2005, para. 3.4)

**ICT in teacher professional development and teacher preparation**

Within education policies, at both national and state levels, teachers are frequently positioned as needing to develop their ICT skills so that the possibilities and potentials of ICT might be realised (Jordan, 2009; Lloyd, 2005). For example, “Teachers need the skills to teach ICT competency and support students in ICT-rich learning environments.” (Department of Education Employment and Workplace Relations, 2010, para 6.)

The need for all teachers to have capabilities to exploit the potential of ICT is firmly embedded in the Digital Education Revolution policy of the Australian Government, with significant funds being channelled to ICT-related school-based teacher professional development through programs such as the Australian Government Quality Teaching Program. Further, the Australian Government plans to develop a Teaching in the Digital Age Work plan that will focus on the teacher professional development required to integrate ICT into pedagogical practice to harness the resources of the Digital Education Revolution. Teachers are positioned in these policies as being deficient in some way and that overcoming their shortcomings will be a significant part of the solution to ineffective use of ICT (Jordan,
Pre-service teacher education is not immune from the push for improved teacher ICT skills and knowledge. In the Victorian Institute of Teaching’s *Standards for Graduating Teachers*, graduate teachers are expected to “know the pedagogical approaches, resources and technologies used to support and assess student learning within their content areas” (Victorian Institute of Teaching, 2009, para 3.5). The National Standards for Teachers states that graduate teachers “implement teaching strategies for using ICT to expand curriculum learning opportunities for students” (Australian Institute for Teaching and School Leadership Limited, 2011, p. 11). Policies relating to teaching standards therefore stress the need for graduating teachers to possess strong pedagogical approaches that maximise the potential benefits of ICT on student learning.

In response, pre-service teacher education programs include consideration of the role of technology in schools in their programs. A variety of approaches to ICT skills and pedagogical understandings are offered across Australian teacher preparation programs (Downes et al., 2001; McDougall, 2008). Stand-alone courses/subjects that aim to develop both ICT awareness and skills are offered in many teacher education programs. Some universities also attempt to integrate ICT into methods or discipline-based courses, modelling how ICT can be used to enhance teaching and learning in the classroom. Pre-service teachers are also exposed to varying degrees of ICT use in the classroom during their practical placements.

The Digital Education Revolution Roadmap (Australian Information and Communication Technology in Education Committee, 2009) also includes a focus on pre-service education, aiming to “ensure that the national graduate teacher standards include rigorous requirements regarding the use of technology in teaching” (p. 9). New initiatives under the banner of the *Teaching teachers for the future* initiative (Department of Education Employment and Workplace Relations, 2011) are based on the belief that “ICT is also transforming pedagogy by providing new ways to learn.” According to the rhetoric surrounding this initiative, teacher education will also be transformed so that all pre-service teachers acquire the skills to incorporate ICT into classrooms:

> A new $7.8 million national project will ensure future teachers can provide every Australian student with the best learning opportunities in an increasingly online world. The project will help all pre-service teachers acquire the skills to incorporate information and communication technologies (ICT) into classrooms across the
nation…a project that is expected to transform the delivery of teacher education.”

(Department of Education, Employment and Workplace Relations, 2011, para. 6)

This analysis of the most recent school education policies at both the national and state levels shows that ICT is positioned as an integral part of the way teachers should teach, and how they should facilitate learning. This represents a shift from early policies that were largely driven by the agenda of supplying suitably skilled workers and citizens for an information society (M. Cox, 2008). In this iteration of integrating ICT, the focus was on students learning how to use ICT as an end in itself or learning about ICT. As the technology itself evolved and teachers’ understandings of how to harness the affordances of technology as learning and teaching tools grew, the emphasis shifted towards learning with ICT, that is, using ICT to support or enhance existing practices (Puentedura, 2010). In this view of integrating ICT, the technology is positioned as a catalyst to enhance learning and teaching (Voogt & Knezek, 2008), but is relatively unsophisticated (Harris, Mishra & Koehler, 2009). Integration of ICT, that is, when ICT is embedded into daily routines and classroom practices, is also taken to exist when opportunities exist for students, as well as the teacher, to use ICT as an integral part of what they do (Department of Education and Early Childhood Development, 2011).

The overt expectation by governments is that schools and teachers will provide students with access to ICT experiences that enrich their learning opportunities (Jamieson-Proctor, Burnett, Finger, & Watson, 2006) not just provide access to ICT experiences. In this sense, ICT is positioned in current policies as a vehicle for school reform, and within that reform agenda, teachers’ pedagogical practices with respect to integrating ICT are at the fore (N. Law, 2008; Pegg, Reading, & Williams, 2007). ICT integration according to policies, is no longer just about using ICT to foster improved performance of existing established practices, but also about using ICT as a vehicle for innovation in pedagogical practices, that is to transform teaching and learning practices (N. Law, 2008; Pegg, Reading, & Williams, 2007). Transformative integration of ICT, however, is now taken to mean the full integration of ICT to bring about learning experiences that would otherwise not be possible (Law & Plomp, 2003). I return to a discussion of transformative ICT pedagogical practices in section 2.5.1 of this chapter.

A number of researchers (Convery, 2009; Oliver, 2011; Robertson, 2003; Selwyn, 2011) argue that the view of ICT in these and similar policies in many countries is based on a soft technological determinist argument, whereby ICT is believed to transform the ways that teachers teach and learners learn in a largely unproblematic way. They argue that policies
assume that technology possesses inherent qualities and has the power to solve problems that are non-technical in nature (Selwyn, 2011) such as problems associated with learning and teaching. This is a view of technology as a catalyst or facilitator of educational improvement, but the power is imbued in the technology itself (Brown & Stratford, 2007) regardless of the context in which technology is used. Critics of the technopositivism (Convery, 2009; Robertson, 2003; Selwyn, 2006) that is inherent in such policies argue that the uncritical notion of the inherent benefits of ICT in education, and of discourses around the potential of integration of ICT into school education become entrenched and steadfast despite varying research findings into the efficacy of ICT. They also argue that deterministic approaches inherent in educational technology policies are simplistic and ignore the complexities and unpredictabilities associated with integrating ICT in schools (Selwyn, 2011). There are also those who argue that the link between using ICT and improving learning is tenuous at best (Convery, 2009). Much research in the educational technology field has been devoted to trying to measure the effects or impact of technology on learning to prove a causal link between use of ICT and improvements in learning, but with little conclusive evidence either for or against (Selwyn, Potter & Cranmer, 2010). However, whilst it is acknowledged that the benefits of using ICT in the classroom are highly contestable and policy reflects a relatively uncritical belief about ICT potential, the fact remains that the current educational policy landscape continues to be grounded in the belief, misplaced or not, in the transformative potential of ICT and one of the consequences of this belief is that teachers, including recently graduated teachers, are expected to develop their ICT practices accordingly.

It is not the intent of this study to examine the claims and counter-claims about the role that ICT may or may not play in improving learning. That is beyond its scope. It is also not the intent of this study to examine the contestability of ICT policy in great detail, other than to acknowledge its existence in the literature, and to examine the effects that current policy may have on shaping the ICT practices of the graduate teachers in this study. These policies can be seen as meta-practices (Kemmis & Grootenboer, 2008), constructed with the intent of producing other practices, in this case how teachers make use of ICT in their classrooms. However, what influences these policy expectations have on shaping the ICT practices of the graduate teachers in this study is a subject of interest for this study.

2.1.2 Inconsistent uptake of ICT

Despite the substantial and sustained investment in equipment and infrastructure as well as an increased emphasis on ICT in both in-service and pre-service teacher education since the mid-
1990s, numerous researchers in the field during that time have identified a disappointing level and nature of ICT integration (M. Cox, 2008; Cuban, 2001; Hennessy, Deaney & Ruthven, 2005; Nichol & Watson, 2003; Tondeur, van Keer, van Braak & Valcke, 2008; Ward, 2003; Zhao, Bo, & Lei, 2008). Studies in the US, Australia and the UK have revealed that the gap between the rhetoric of transformation and the reality within the classroom still exists even in the face of ongoing policy support, funding and initiatives to support the integration of ICT.

The history of ICT integration points to limited integration of ICT into typical classes in secondary schools and isolated instances of best practice integration of ICT, despite the general availability of ICT in schools and adequate basic ICT skill levels of teachers and students (Baskin & Williams, 2006; Becker, 2000; BECTA, 2006; Hayes et al., 2005; McGregor Tan Research, 2008; Meredith, Russell, Blackwood, Thomas, & Wise, 1999; Tondeur et al., 2008).

The literature further suggests that, in most classrooms, learning and teaching is hardly ‘transformed’ by ICT. When teachers use ICT, it is generally to improve their efficiency or to support or sustain their existing pedagogical practices, rather than to use ICT to transform pedagogies at a more fundamental level (Law, Pelgrum & Plomp, 2008; Teo, Chai, Hung & Lee, 2008; Yelland, 2007). In other words, most teachers used ICT where they perceived its affordances for familiar pedagogical practices (Beauchamp & Kennewell, 2008), which are generally more authoritarian teaching practices (Kennewell, Tanner, Jones & Beauchamp, 2008) For some researchers in ICT in education, technology is too frequently being used to support broadcast pedagogies (Rowan & Bigum, 2003), the passive delivery of information via some form of presentation software projected onto a whiteboard or more latterly, the use of interactive whiteboards and learning management systems. Student use of ICT is similarly confined to a small number of common functions – cutting and pasting information from websites into word-processed essays and assignments or PowerPoint presentations (Carr, 2010).

The research on the extent and nature of ICT integration in schools has led some analysts to state that “in schools its impact in these areas appears at best to be minimal and at worst relatively ineffective” (Nichol & Watson, 2003, p. 132) or that “the effects of successful integration of ICT seem to be confined to a very small number of schools” (Zhao et al., 2008), p. 639). Fluck & Dowden (2009) believe that integrating ICT into classroom practice, in general, has become “code for replicating existing learning” and “using computers as electric pencils” (p. 69). It would appear that the much heralded and hyped potential of ICT that is
envisioned in policy, and what is experienced at the school level, are distinctly different. Many factors are believed to contribute to the relatively low, sporadic and somewhat superficial uptake of ICT in classrooms. In the early days of ICT integration, a lack of access to technology and limited teacher skills in using ICT were the two main perceived barriers to the integration of ICT in many classrooms (M. Cox, 2008; Levin & Wadmany, 2005). Other factors that have been identified as influencing the extent and nature of ICT integration in schools focus on lack of time to develop new pedagogical practices; the impact of school-level factors such as leadership, school culture, resources and supports; the students themselves (Groff & Mouza, 2008; Levin & Wadmany, 2005) and the lack of associated reform in curriculum and assessment practices (Somekh, 2007). The sustained levels of investment over the last fifteen years in resourcing classrooms across Australia with ICT equipment, network infrastructure and digital content has seen an incremental movement of ICT from peripheral locations to being more available in more areas of schools (Lloyd, 2005), thus reducing access to equipment as one of the major barriers to ICT integration. Whilst other barriers may still remain, much of the literature, and indeed the policy, emphasise that teachers are crucial in determining the success of ICT integration since they have the greatest influence on what happens in a classroom (Groff & Mouza, 2008). Teachers are often positioned as responsible for the ‘failure’ of ICT to reach its transformative potential in schools (Somekh, 2008). Their lack of technological skills and knowledge were initially seen as a barrier to integrating ICT (Groff & Mouza, 2008) and much early professional development effort focused on addressing skills shortcomings (G. Beauchamp, 2006). But, more recently, the focus on explanations for the failure of schools to capitalise on the transformative potential of ICT has shifted to an examination of the nature of the use of ICT, that is, how ICT is used in the classroom to transform teaching in order to create new opportunities for student learning (Angeli & Valanides, 2009). It is argued that the positive impact of technology does not come automatically; much depends on the how teachers use ICT in their classrooms, that is, what pedagogical practices they employ when integrating ICT (Zhao et al., 2008).

The issue of integrating ICT effectively into teaching practice is one that requires a detailed understanding of the complex contextual relationships between teaching and technology (Mishra & Koehler, 2006). It is far more complex than just providing equipment and showing people how to use it (M. Cox, 2008). A major reason put forward for the relatively unsophisticated uptake of ICT is that pedagogy matters enormously when considering the
integration of ICT but that the development of appropriate pedagogy for integrating ICT in teaching has lagged behind the far more techno-centric investments in hardware, software and teacher ICT training (Hennessy et al., 2005).

Most approaches to the integration of technology have been organised around the affordances of the technologies being used, rather than being driven by the needs of students and curricula (Harris et al., 2009). In a sense, the policy vision of ICT integration has been driven more by the technical requirements of integrating ICT, around procurement, installation and implementation rather than by pedagogical issues (Somekh, 2010). Any discussion of transforming learning and teaching through ICT therefore needs to look at what appropriate pedagogical practices for integrating ICT are, as well as how such practices might be changed or shaped. These issues will be discussed in section 2.5 of this chapter.

In summary, current education policies at the national and state levels clearly position the integration of ICT into the classroom as a vehicle for reform in terms of transforming learning and teaching. However, despite years of sustained investment in putting ICT into classrooms, the extent and nature of integration of ICT into classrooms has been inconsistent and disappointing, leading to a gap between policy rhetoric and reality in classrooms. The literature suggests that more attention needs to be focused on the role of pedagogy in the integration of ICT into schools as well as on the complexities of using ICT in the classroom. This study is strongly focused on examining the pedagogical practices of a small group of teachers with respect to using ICT in the classroom, and examining how those pedagogical practices develop and are shaped.

2.2 ‘Digital Natives’ expectations

The previous section examined the expectations about the integration of ICT in school education that are implicit and explicit in current Australian and Victorian policies. Another set of expectations centre around the notion of a digital generation of young people variously referred to as the digital natives (Prensky, 2001), a term derived from John Perry Barlow’s Declaration of Independence of CyberSpace (Barlow, 1996), or the net generation (Tapscott, 1998), Millennials or Generation Next. These terms describe young people born since the 1980s who are characterised as growing up in an ICT-enriched world, comfortable in using technology in all aspects of their lives. To the digital natives, technology is just a part of the fabric of life, there to make life easier and better, or in most cases, just there, just how things are now done. To people like Prensky and Tapscott, members of this new generation of
learners have different learning characteristics to other generations. According to Prensky, they learn at ‘twitch speed’, crave interactivity and prefer visual modes of learning. Buckingham (2008) summarises the key characteristics as described by Prensky and Tapscott:

They are seen as more inquisitive, self-directed learners, more sceptical and analytical, more inclined toward critical thinking and more likely to challenge and question established authorities than previous generations. (p. 16)

Prensky goes so far as to assert that the brains of young learners are somehow wired differently, allowing them to effectively multitask in ways that older people cannot manage. Generational differences in learning approaches are seen to be produced by technology rather than being the result of other socio-cultural factors (Buckingham, 2008). Despite little evidence to support these sorts of contentions, the discourse of the digital native has taken hold and has influenced people’s expectations about the learning needs of young people in the early part of the 21st century and how young people today should be taught (Bennett, Maton, & Kervin, 2008). Technology is seen as the solution to their learning needs.

Teachers graduating from universities in the last few years are also seen as members of the digital native generation (Prensky, 2001). But Prensky and Tapscott set up unfortunate binaries between the digital natives/Net Gen and those in preceding generations. Those not born into the technology age are positioned as digital immigrants – thrust into a technology-laden world, in a constant state of catching up. Most older and more experienced teachers are placed by proponents of the digital native approach into the digital immigrant category – and like most immigrants, some assimilate more readily than others. Prensky argues that the transformations to education promised by the potential of ICT have failed to materialise on a large scale, in part, because too many teachers are believed to be immigrants to the digital world with a resultant high disparity between the ICT experiences of current students and the sophistication and degree to which these technologies are employed by teachers (Prensky, 2001). Others more recently have argued that recently graduated teachers, having grown up with digital technologies, may be more open to using ICT in their own teaching (Bate, 2010).

The corollary to Prensky’s argument is that the familiarity that early career ‘digital native’ teachers have with ICT will flow through to effective use in their classrooms. His view was also echoed by policy advisers of the time who believed that ‘If you can get teachers to use technology effectively in their own lives, you have won 90% of the battle’ (Rosenthal, 1999, p 22). More recently, some have argued that ‘in the so-called Digital Age it would be reasonable to assume that beginning teachers have well-developed ICT skills and
understandings’ (Elliot & Brown, 2007, p. 121).

However, assumptions around the digital native argument may be flawed and warrant more critical examination. The digital native argument is centred on an assumption that graduate teachers are a rather homogeneous group, who share similar characteristics around digital technologies. But the assumption of homogeneity is seriously questioned. Recent research suggests that technology plays a more diverse role in the lives of young people than the digital natives argument would suggest.

Arguments about digital natives are predicated on the assumption that young people have comparatively universal and uniform digital upbringings (Kennedy, Judd, Churchward, & Krause, 2008). However, there is diversity in access, ability and predispositions among young people towards using ICT. Digital native arguments ignore the effects of the digital divide on young people’s ICT use (Buckingham, 2008). Research into the digital literacies of undergraduates in a large Australian university confirms the digital heterogeneity of the student population (Kennedy, Krause, Judd, Churchward & Gray, 2006). Their study found that undergraduates were highly proficient at using digital technologies, but when one moved beyond ‘entrenched technologies’ such as mobile phones, the Internet for research and socialising, the proficiency and confidence in a range of other technologies that are commonly used in schools showed considerably greater variation. Similar studies from South Africa (Elliot & Brown, 2007) and the United States (Kvavik, Caruso & Morgan, 2004) showed similar patterns, with the majority of university students commonly using word processing, email and the Internet, but very few going beyond basic functions to create their own content or multimedia. These studies found that a significant proportion of students had lower-level skills than might be expected of so-called digital natives. A recent smaller scale study of pre-service primary teaching students in an Australian university (Carr, 2010) also showed that pre-service teachers were highly proficient at a small range of technologies that were used primarily for personal communications and entertainment, but that beyond the use of word processing and presentation tools, very few reported more than basic, or even low, proficiency levels.

Not all graduate teachers would necessarily see themselves as digital natives. Carr’s study (2010) shows that a small, but significant, proportion of pre-service teachers do not identify with the notion of someone who is technologically proficient. A small proportion of pre-service teachers are mature-age students who are returning to study after years out of the workforce, and have largely missed the digital roller-coaster ride. They see themselves as
being left behind by technology and feel they need to work hard to catch up. Furthermore, even among younger pre-service teachers who fit Prensky’s chronological definition of being a digital native, there are many who report being weak when it comes to digital technologies. Buckingham also points out the general banality of ICT use among many young people, suggesting that most use of ICT is for relatively mundane forms of communication and information retrieval than for highly innovative and creative purposes (Buckingham, 2008).

Further, familiarity with ICT in the personal sphere may not automatically translate to effective use of ICT to enhance learning in the classroom (Russell, Bebell, O’Dwyer & O’Connor, 2003). While many of our pre-service teachers may be proficient and feel confident in using technology in their personal lives it is dangerous to assume that membership of the digital natives’ generation is synonymous with knowing how to employ technology strategically and critically to enhance learning since ‘the transfer from a social or entertainment technology, a living technology, to a learning technology is neither automatic nor guaranteed’ (Kennedy, Judd, Churchward, & Krause, 2008, p. 119). Keating and Evans argue that there is a disconnect between using ICT in a personal sphere and their confidence in using technology effectively in their own classroom practice (Keating & Evans, 2001). In a study of the digital literacies of pre-service teachers in one US university, Lei (2009) argued that being able to use technology does not necessarily mean being able to use technology critically, wisely or meaningfully. Lei argues that students’ competencies are superficial and hide ineffectiveness and shallow uses of technology (Lei, 2009). Therefore “the assumption that technology use in classrooms will increase simply because a teacher grew up in a technology-rich world appears false” (Russell et al., 2003, p. 308).

Generally then, growing up in an ICT-enriched world may not be sufficient to underpin effective integration of ICT that transforms the learning experience in school classrooms. This study is interested to understand how graduate teachers develop such knowledge in the workplace.

### 2.3 Practice, practice, practice

Put very simply, practice is the activity involved in getting work done (Brown & Duguid, 2000). The term ‘practice’ can be seen as synonymous with ‘routine’ or what people really do (Gherardi, 2009). Beckett and Hager (2002) refer to practice as “the successful performance of work” (p. 91). But these almost throw away lines understate the complexity of what practices are.
In looking at how a group of recently graduated teachers enact their knowledge of how to integrate ICT into their teaching within the context of a secondary school, how that knowledge is performed is a central enquiry. How these graduate teachers learn about integrating ICT into their own teaching practices, that is, how the graduate teachers learn within an organisation, the school, makes this research a study of learning and knowing in practice (Gherardi, 2006). At this point I turn to an examination of the literature about how practices are developed, and how learning is achieved through practice.

How do we learn a practice? There are many schools of thought but I wish to focus briefly on three approaches – the individual, cognitive approach; a social, participative approach; and a relational approach.

### 2.3.1 Individualistic and cognitive approaches to developing practices

Conventional explanations of learning, grounded in cognitive/functionalist theories of learning, argue that learning is essentially something that resides in the heads of the individual through the acquisition, appropriation, transmission and storage of knowledge (Gherardi, 2006; Gherardi & Niccolini, 2000). Learning in this framework is seen as largely a cerebral process in which the individual learner internalizes knowledge, regardless of how that knowledge was presented to the learner, whether it be from the transmission of information from another source, the discovery of information or knowledge or from a new experience. Practitioners then transfer this mix of knowledge of learning, disciplinary knowledge and professional expertise, to the context in which they find themselves (Beckett, 2011).

Yet, such theories about learning raise a distinction between the inside and the outside – in cognitive theories of learning, learning happens ‘on the inside’ and is an individual attribute (Beckett, 2011). The world the learner inhabits and their relations with aspects of that world are largely ignored. Learning is seen as a largely unproblematic process of transmission and assimilation of propositional knowledge (Lave & Wenger, 1991). In such a paradigm, the knowledge and skills of the practitioner are assumed to pre-exist and are mostly separated from the activities and situations in which professionals practice (Mulcahy, 2011).

Such theories, however, fail to account for how different people construct meaning differently or how people revisit and reconstruct these meanings, ignoring or resisting certain meanings, or how their practices may be transformed through collective action and reflection (Fenwick,
2.3.2 Social and participative approaches to developing practices

A different approach to considering the development of practice is a more social and participative approach, one that acknowledges that practices, and how we learn practices, are both highly situated. Practices are what particular people do, or perform, in a particular place and time, with particular people and within particular cultural and discursive conditions, mediated by a diverse range of artefacts. In other words, we learn our practices while working together with others, and as such, these are socially shaped rather than being solely the purview of the individual (Beckett, 2011). The turn towards a social and participatory approach generates a far less individualistic and more dynamic view of learning a practice (Mulcahy, 2011).

Practice exists because people are engaged in actions whose meanings they negotiate with one another (Wenger, 1998b). Practice, according to Lave and Wenger (1991), “denotes a set of socially defined ways of doing things in a specific domain: a set of common approaches and shared standards that create a basis for action, communication, problem-solving, performance and accountability” (p. 38). The emphasis here is firmly on the social or collective creation of meaning around a practice or a set of practices.

Practices as situated

Practices are enacted in local social and cultural conditions that embody “a certain way of behaving, a perspective on problems and ideas, a thinking style and even in some cases an ethical stance. A practice is a sort of mini-culture that binds a community together.” (Wenger, McDermott & Snyder, 2002, p. 39). A similar practice may be enacted in different ways in different social and cultural settings because they involve specific kinds of social connections and relationships (Kemmis, 2010b)

Practices are historically formed and structured, involving traditions of thought and action and located against the background of local and more global history (Kemmis, 2010b; Kemmis & Grootenboer, 2008). Traditions of thought amongst those who are practitioners evolve over time (Kemmis 2010b; Wenger, 1998; Lave & Wenger, 1991). For example, the 18th Century education discourse framed the teacher as a wise ‘sage on the stage’, a highly respected, revered community member, and where education was seen as a privilege. The current discourse in education frames teachers as service providers and students and their parents as the client, with associated transparency in teacher responsibilities and
accountabilities.

On this analysis, the lives of the individual in a practice also provide a context for that practice – the practice occurs “against the wider background of the narratives of their lives” (Kemmis, 2010b, p. 18).

Practices will also vary from one location to another. Gherardi (2006) describes practice as knowing how things are done in the specific organisation in which one works and knowing that your colleagues will do things in a very similar, if not identical, way. Classrooms in a school in rural Africa are likely to look very different to and contain different teaching practices from modern ‘learning spaces’ in some Australian schools. Both are readily recognised as schools, sharing a fundamental similarity, yet the details can differ significantly.

Kemmis (2010b) argues from a Marxist tradition that practices are also economically and politically situated. The imperatives of administrative systems and economic transactions within a school as well as external discourses also shape educational practices (Kemmis 2010b). For example, the availability of budgets to allocate to ICT, to libraries, facilities and programs all have an impact on practices within a school, even if such transactions are not always apparent. Many people who are affected by the education of the next generation (parents, employers, education administrators, politicians) have ideas about what education should achieve (and how to achieve it) that may be significantly different from ideas and expectations internal to the field. These relationships, alongside internal hierarchies within schools and social status afforded particular teachers or groups of teachers, form the political economies of schools (Kemmis & Grootenboer, 2008).

The situative perspective on learning had its origins in the work on situated learning theory of Jean Lave and Etienne Wenger (1991). Situated learning theory focuses heavily on learning by newcomers, stressing learning as a continuous process of negotiating meaning between other people, an active, engaged, situated and identity-forming process (A. Cox, 2005). Situated learning theory proposed an approach to understanding learning that represented a paradigm shift away from the traditional positing of learning as a psychological process located in the heads of the individual (Hughes, Jewson, & Unwin, 2007) focusing on the informal social interaction, rather than a planned mechanistic process of cognitive transmission (A. Cox, 2005).

To Lave and Wenger, the central characteristic of learning in a workplace is the process of legitimate peripheral participation or the process by which newcomers become part of a
community of practice. Newcomers start off being peripheral to masters or more experienced members of a practice, but participate in legitimate and useful ways (Fox, 1999). Legitimate peripheral participation suggests a sense of belonging but on the periphery, that is, located in the community but not being a full participant in that community, but that peripheral participation leads to full participation over time.

Lave and Wenger (1991) argued that, to become an expert practitioner, opportunities to engage with others who face similar problems and challenges are necessary. Learning a practice involves becoming a member of a community of practice, thereby understanding its work and its talk from the inside (Brown and Duguid, 2000). A community of practice, as defined by Lave and Wenger, are groups of people who share a common concern, or set of problems, or a particular passion and who deepen their knowledge and expertise in this area by interacting in an ongoing basis. A community of practice shares a repertoire of actions, styles, artefacts, concepts, discourses and stories. Members of a community of practice typically share information, insight and advice; they help each other solve problems; they think about common issues, explore ideas and sound each other out. They may even develop a common sense of identity. The notion of a community of practice therefore emphasizes practice as a joint enterprise and belonging (Gherardi, 2006).

**Practice as performance**

Social theories of learning not only suggest that learning cannot be separated from the context or situation within which the learning takes place, but that learning forms an inseparable part of the ‘doing’ of practice (Lave & Wenger, 1991). That is, context is important for learning a practice, but the learning that occurs through doing, or performing, a practice is also significant (Beckett, 2011). Practice therefore connects ‘knowing’ with doing (Gherardi, 2006) – “practice is what happens when people act” (Kemmis, 2010a, p. 10). Practices are not merely abstract, theoretical constructs or propositional knowledge about a practice but are enacted in the real world. Brown and Duguid (1991) and Gherardi (2006) argue that practice in this context relates to the actual conduct rather than abstract theory. Kemmis (2010a) takes this idea of performance further, arguing in the Aristotelian tradition, that practice is a form of conscious, self-aware action (author’s emphasis) rather than being theoretical contemplation or simply of the performance of the technical actions of the practice. This characteristic points to the tension between theoretical and life-world understandings, between the body of abstract knowledge or knowledge about a practice, and another body of knowledge that is contextual or situated, that is, developed as a result of personal knowledge gained as a result
of enacting that practice in that context, but with self-awareness and reflexivity (Kemmis, 2010a).

**Practice as judgement amidst ‘hot action’**

Learning a practice, argue Lave and Wenger (1991), is not just a matter of acquiring information or abstract knowledge about a particular practice; it requires developing the disposition, demeanour and outlook of others who share that practice. A practice, or set of practices, should have meaning to the practitioners and to those with whom they interact. In this sense a practice, or set of practices, expresses values and social norms (Kemmis, 2010b), growing out of a shared judgement about what is appropriate or right for that practice (Beckett, 2011).

To enact a practice therefore requires explicit professional knowledge of the techniques or technical skills of the practice – the ‘know what’ of that practice (Brown & Duguid, 2000) or the techne (Kemmis & Smith, 2008). Kemmis and Grootenboer (2008) posit that ‘to conduct a practice is to evoke the role of knowledge relevant to it, naming and speaking (those aspects of) the world the practice addresses.’ (p. 47). But practice is more than knowing what – it is also about knowing how to enact that professional knowledge, often in the context of complex circumstances that characterise daily life. Being a member of a practice suggests ‘knowing’ across a range of domains of knowledge – procedural, propositional, practical, tacit (Eraut, 1994) – the know what and the know how.

Being part of a practice suggests knowing how to do a ‘good job’, as judged by adherence to the ‘rules’ or ethos of a practice (Beckett, 2011), the conventions of that practice. This requires the practitioner to have the “capacity to make judgements, a sensitivity to intuition, and an awareness of the purposes of the actions” (Beckett & Hager, 2012, p. 12). Most professional practitioners face situations on a daily basis that are not covered in the theoretical knowledge of the practice, but being a professional practitioner is characterised by the ability to make successful judgements about what course of action to take in the moment, making on-the-fly decisions whilst immersed in “the daily grappling with the contingencies of unique situations” (Beckett, 2011, p. 62). Michael Eraut (1994) used the term ‘hot action’ to describe the typical work of a teacher:

> The teacher has no time at all to reflect: choices made during the preparation of teaching may be decision governed, but those made during the course of teaching are largely intuitive. The pressure for action is immediate, and to hesitate is to
Further, these judgements, or hot actions, need to be not only consistent with the commonly-accepted conventions of the practice, but should represent a sense of practical wisdom, or *phronesis*, that is, a moral disposition, or *ethic* (Beckett, 2011) to act wisely and with common sense, to do the ‘right’ thing. The notion of what is right extends beyond the technical, or compliance with missions, goals and outcomes that pepper most professions in the early 21st century, including teaching. Doing the ‘right’ thing, in this Aristotelian sense, requires a sense of understanding *why* a practice is being undertaken, what the ulterior purpose (Beckett & Hager, 2002) of the practice is, which may require the practitioner to analyse and reflect on both the goals and methods of their practice (Beckett & Hager, 2002; Kemmis & Smith, 2008; Smith, 2008).

**Practices as explicit and tacit**

Expected ways of operating are not always explicit, or codified in the theoretical knowledge about a practice, but includes a range of tacit conventions, rules of thumb, subtle cues, underlying assumptions and shared world views (Wenger, 1998). Much of what we know is tacit in nature (Polanyi, 1967) particularly in relation to knowledge about the things we do, which we tend not to be able to articulate even if we are doing it successfully (Burbules, 2008). Practice therefore includes what is said and not said (Wenger, 1998b). Practice includes what is represented by tools, language, documents, images, symbols, roles, criteria, procedures and regulations.

To become a practitioner one also needs to understand the tacit knowledge of a practice, that is the embodied expertise, the deep understanding of the complexities of a practice that is ‘picked up’ over time in ways that are largely tacit themselves (Burbules, 2008). Learning the tacit elements of a practice is often through a combination of observation and imitation of practices which are modelled by more experienced practitioners (Burbules, 2008) who draws attention to what is valued within that practice in their choice of what is being shown or taught, or as Beckett puts it “becoming a worker… is centrally about learning from the intertwining of the normative (What is worthwhile) with what is behavioural (What is being done) and the glue is the tacit” (Beckett, 2011, p. 65).

**Practice as reproducible and transformative**

Practice is also more than what people do in a particular field. It is also something that can be reproduced, transferred or taught to others (Kemmis, 2010b). A practice is recognised as such
when its ways of doing are regular, or an habitual mode of doing (Gherardi, 2006) and patterns of organised activity are repeated. It is the recursiveness of a practice that makes it recognisable (Gherardi, 2009). Practices might endure across time and space, but in being reproduced and transferred, the nature of the original practice is not necessarily preserved but may be transformed (Kemmis, 2010b).

Gherardi (2009) likens the reproduction of practice as being more similar to human reproduction than to mechanical reproduction in that repeating the original both maintains the constants yet simultaneously introduces change. Learning a practice is never simply a process of transfer or assimilation - a practice and knowledge about that practice is always in motion (Fenwick, 2006). Conflicts, difference, tensions, contradictions between participants in the community must be constantly negotiated. New practitioners might reproduce existing practices or transform their practice by altering different elements of their practice, based on their reflections about their own experiences (Kemmis, 2010b).

One of the key criticisms of the situated learning/communities of practice approach is that Lave and Wenger’s notion of participation is more aligned with continuity and reproduction than with transformation and innovation, with a successful path to full participation occurring with minimal changes to the practice, that is with alignment to existing practices (A. Fuller, 2007; Hughes et al., 2007; Mulcahy, 2011). Disciplinary power privileges routinised behaviour over critical action (Britzman, 2003) resulting in conformity with existing practices (Usher & Edwards, 2007) which become rigid (Shulman, 2005) or sedimented (Youdell, 2010). Too much focus is given to the one-way movement by the novice from the periphery towards the centre, occupied by the experienced practitioner, whilst the possibility of movement in unexpected directions are not considered – “instability and inner contradictions of practice are all but missing” (Engestrom & Miettinen, 1999, p. 12). Lave and Wenger (1991) themselves point to contradictions inherent in the idea, on the one hand, of legitimate peripheral participation as a means of generating stability and continuity over generations and, on the other hand, the displacement that emerges in the same process as newcomers move toward full participation and replace the ‘old-timers’ (p. 114).

These major criticisms relate to the notion of power and how power is treated, or not, in situated learning and communities of practice theories (A. Cox, 2005; Hughes et al., 2007; Jewson, 2007). The perceived lack of focus on change and innovation relates directly to issues of inequalities and asymmetries of power (Mulcahy, 2011). Novices are frequently positioned as being without power (Britzman, 2003), vulnerable to the pressures of the
existing culture (Ertmer & Ottenbreit-Leftwich, 2010) to the extent that they become colonized (Gee, 2000). Issues of power are left ambiguous, and are confined to conflicts between master and apprentices. It thus fails to adequately explain all relations of power within a community and between communities. Although Lave and Wenger acknowledge these possibilities (1991, p. 42), they do not incorporate any conceptual mechanisms for analysing the origins, forms or effects of conflict and power struggles (Jewson, 2007). There may be more ‘unequal relations of power’ than might exist between newcomers and old-timers. For example, Lave and Wenger’s model does not consider potential for conflict between the old-timers, and issues of hierarchy and the micropolitical dynamics that exist within a community (Fenwick, 2006).

In talking about the ‘diverse ways’ of taking up the perspectives of the existing practitioners, Beckett points to the exercise of agency on the part of the novice practitioner to adopt, or alternatively accommodate existing perspectives. Some critics of situated learning theory suggest that it largely ignores the agency of the individual (Eraut, 2002; Fenwick, 2006), that is, the capacity to act purposively and reflectively (Beauchamp & Thomas, 2009; Moore, 2007). Mutch (2003) argues that even when embedded in social structures like a community of practice, individuals retain a ‘durable disposition’ to act. However, Lave and Wenger stress their relational view of learning in a community. That is, there is agency on both sides of the relationship — the community can impose its norms and practice, but at the same time these are mediated by the individual’s agency, their subjectivity, intentionality and interest (Billet, 2007). In other words, Lave and Wenger argue that the community and the individual are shaped by, and, in turn, help to shape each other (Hughes et al., 2007).

Other criticisms of situated learning theory/communities of practice focus on the implied assumption that development of practice takes place within pre-given and largely stable macro-social contexts, such as gender, or class (Fox, 1999). Further, learning a practice is argued to take place in informal groupings that arise more or less organically (Wenger, 1998) whereas interactions in the workplace are more likely to be structured by the more formal (A. Cox, 2005). The communities of practice model also downplays the complexities that occur at the boundaries between communities (Mulcahy, 2010), for example issues of power that might arise out of relationships between different communities, or between communities and other entities (Barton & Hamilton, 2005; A. Cox, 2005).

Despite these criticisms, I have shown here that situated learning/communities of practice theory has given rise to serious considerations of the sociality of practice and these have
serious implications for practitioner(s) identity.

**‘Becoming’ – identity formation in the doing and learning of practice**

Earlier I put forward the idea that practice connects knowing with doing. There is also support in the literature for the idea that practice connects knowing with being. In other words, how an individual performs a particular practice, and in performing that practice, learns that practice, will be influenced by how they see the practice and how they see themselves within that practice. In this sense, practices impart identities (Gherardi, 2006) or “it is, simply, in our doing that we find our being” (Beckett, 2011, p. 58). A person’s experiences of a practice, and their experiences with and within a practice, become incorporated into their identities. The process of learning a profession is therefore reconfigured as ‘a process of becoming’. As Dall’Alba (2009) puts it “learning to become a professional involves not only what we know and can do, but also who we are ‘becoming’” (p. 34).

Wenger (1998) also argues that there is a “profound connection between identity and practice” (p. 149). Wenger sees an identity as a layering – as we encounter our effects on the world and develop our relations with others, these layers build upon each other to produce our identity (p. 151). Thus, in reproducing or transforming their own practice, practitioners also reproduce or transform their identities as practitioners (Kemmis, 2010). In this sense, identity is not fixed, but always evolving. Such a view of a fluid identity is consistent with ideas put forward by other theorists such as Butler and Foucault. Butler (1990) argues that, rather than being a fixed attribute in a person, identity is seen as a fluid variable that shifts and changes in different contexts and at different times. In other words, identity is something that you perform at particular times, rather than a defining characteristic. Foucault also supports the idea that identity is not a fixed thing within a person, not a pre-given entity, but is a shifting, temporary construction that is generated by discourse (Prado, 2000).

Applying this idea of identity to being a ‘graduate teacher’, it can be argued that, rather than being fixed set of attributes, the nature of performing being a graduate teacher will change in different contexts – historic, cultural and situational. The image of self as teacher will be influenced by the occupational and organisational groups to which the graduate teacher feels they belong, and on the situations in which they find themselves (Gherardi, 2006). Thus it is important to examine the context in which graduate teachers are placed, that is, the culture of the school, in order to unpack the relationship of organisational learning to the building and performing of identity. This study is interested in how graduate teachers identify themselves within their profession, and within the organisation of the school and how this might shape
how they integrate ICT into their practice. And if identity is not a fixed entity, but a fluid variable, this study is also interested in examining shifts in identity of the graduate teachers.

2.3.3 Considering materiality

Practice is also situated in a material context involving interactions and exchanges with specific aspects of the world of objects and artefacts, the physical and natural world. As Kemmis and Grootenboer (2008) offer, “what people can do will be shaped in material terms by the arrangement of things” (p. 49). In teaching, the material world is at times overwhelming, as teachers perform their practice in the context of a variety of things – spaces, tools, bodies and textual objects (Fenwick & Edwards, 2010). Spaces in a school where practices are performed are diverse and include classrooms, staff rooms, libraries, computer laboratories, science laboratories, gymnasiums, and playgrounds. Teachers are immersed in using tools such as pencils, books, paper, whiteboards, computers, and laptops. Teachers also deal with textual objects that increasingly direct, make visible and inscribe what comes to be valued as practice knowledge (Farrell, 2006) such as the local school policies, curriculum documents, the lesson plans, the text books and other artefacts. Teaching is therefore constantly mediated by material things (Fenwick & Edwards, 2010).

The emphasis in situated learning/communities of practice theory is very strongly on the development of practice through the social interactions between members of that community and with other communities. Wenger (1998) is explicit in his interpretation of whom or what can be a participant in a community. He reserves the term participant for “actors who are members of social communities” who “share the possibility of mutual recognition” (p. 56). He explicitly excludes material objects and spaces as participants. In a footnote (1998, p. 286), Wenger distinguishes his theoretical approach from those that take a more functional, cybernetic or system-theoretical account, arguing that he is interested in meaning and in learning, not just in descriptions. To Wenger, the mutual ability to negotiate meaning and to recognise an experience of meaning in each other makes a difference. Thus, communities of practice theory takes a very humanist view of practice.

That is not to say that material objects do not play a role in the concept of communities of practice. Wenger (1998) introduces the concept of reification to communities of practice, which refers to “the process of giving form to experience by producing objects that congeal this experience into ‘thingness’” (p. 58). Wenger argues that the process of reification is central to every practice, that any community of practice reifies something of that practice, such as a written procedure, a lesson plan or textbook – abstractions, tools, stories, terms and
concepts that reify something of that practice in a congealed form. Wenger goes on to argue that the nature of performing a practice or part of a practice is shaped by reification – the tools that we use, or the material objects of that practice change the nature of the practice. He sees reification and participation as constitutive of each other – participation in a community depends on reification. Wenger gives the example of a word processor, which reifies the activity of writing, but at the same time changes how one goes about the process of writing. In other words, the products of reification are not simply material objects, but are reflections of the practices that produce them and have a mediating effect on those very practices, an indirect effect.

Wenger offers a range of other examples of reification that include quite different kinds of representations of meaning within a community of practice – language-based artefacts, computer applications, monuments and architecture, visual images, numbers, diagrams and even dress codes. Barton and Hamilton (2005) point out that reifications vary in their ability to carry meaning, in their durability and portability across time and space and cultural difference and that being able to describe and analyse these differences in relation to particular settings increases the theoretical power of reification as articulated in communities of practice theory.

The notion of reification and the mediating role played by artefacts provides another opportunity for considering alternative traditions of thought to augment the ideas put forward in situated learning and communities of practice theory. This is considered particularly the case where technology is involved. Technology is not neutral: technology is clearly far more than an inert contextual feature; it is a mediational means which plays an integral role in shaping activity and the actions and interactions of pupils and teachers…thereby bestowing shared ‘mediated agency’ upon the participants who operate with it. (Hennessy et al., 2005, pp. 285-6)

There are increasing calls for the consideration of theories which place a greater emphasis on the non-human or socio-material elements of situations, such as Actor-Network Theory (ANT), Activity Theory or cultural-historical activity theory (CHAT) and complexity theory. Such theories, in particular ANT, are offered as way of strengthening the notion of reification specifically (Barton & Hamilton, 2005) and communities of practice theory more generally (A. Cox, 2005; Fox, 1999; Jewson, 2007; Oliver, 2011; Selwyn, 2011).

However, the adoption of theories such as ANT requires a significant ontological shift.

Proponents of ANT (Fenwick & Edwards, 2010; Latour, 2005; J. Law, 1992, 2006; Mol &
Law, 1994; Usher & Edwards, 2007) adopt a ‘radical symmetry’ where humans and non-human entities are treated equally – “humans are not assumed to have a privileged a priori status in the world” (Fenwick & Edwards, 2010, p. 7). At the same time, ANT asserts that everything, human and non-human, is in fact an effect of different forces that emerge through the interactions and transactions that are negotiated within the network of entities. In this post-human ontology, "the human subject is not agentic and intentional, but is itself an effect of a particular network" (Fenwick & Edwards, 2010, p. 8). Critics of this notion of radical symmetry argue that ANT ignores key features of agency and the subjectivity of humans (Pickering, 1993). To be an agent, according to Bandura (2001) is intentionally to make things happen. Agency implies intentionality, the exercise of forethought, self-reactiveness and self-reflectiveness (Bandura, 2001):

Agency thus involves not only the deliberative ability to make choices [intentionality] and action plan [forethought] but the ability to give shape to appropriate course of action and to motivate and regulate their execution [self-reactiveness]. (p. 8)

The metacognitive capability to reflect upon oneself and the adequacy of one’s thoughts and actions is another distinctly core feature of agency [self-reflectiveness]. (p. 10)

However, followers of ANT eschew this view, arguing that, in effect, nothing, as in no-thing, neither human nor non-human, has agency:

ANT does not conceptualise agency as an individuated source of empowerment rooted in conscious intentions that mobilise action. Instead, ANT focuses on the circulating forces to get things done through a network of elements acting upon one another. (Fenwick & Edwards, 2010, p. 21)

The ontological shift around agency that ANT asks may be difficult for some to make. But ANT is not just about the material – it is about tracing the little things, the mundane things and how they relate, the negotiations that take place and the effects of these micro-negotiations. When integrating technology, there is interaction between many things – many little things. Examination of the interactions between the little things, human and non-human, may throw additional light on how graduate teachers’ use of ICT is shaped in the early part of their career, rather than just focusing on the relationships between the human actors within a school. The minor events, objects and people that may or may not act on the graduate teacher’s motivation to integrate ICT and the ways in which they integrate ICT into their pedagogical practices are important to consider.
Research into affect tells us that short-term and regularly occurring events are regarded as being of greater significance than major but irregular events (Bandura, 1997). Little things sometimes get in the way of our aims. If the same minor but frequent negative events or hassles (Kitching, Morgan, & O'Leary, 2009) keep getting in the way of the graduate teachers, they may act to de-motivate the graduate teachers to use ICT in their classroom. Alternatively, little experiences of success may act as positive influences on ICT-based pedagogical practice. Tracing the effects of the little things that interact with the graduate teachers as they attempt to integrate ICT is therefore important in studying how graduate teachers develop their ICT-based pedagogical practices.

Communities of practice and ANT share some important features – both lenses treat knowledge and learning as highly situated and contextualised. Both lenses see knowledge as what is created as a result of relations between actors; in communities of practice these actors are participants in a community of practice whereas in ANT they are actors within a network – they are both focused on relational effects or enactments.

ANT then adds to communities of practice theory in important ways. First, it surfaces the material, or more accurately the socio-material, which is largely unproblematised in communities of practice theory, which takes a more humanistic view. Secondly, it allows for a more detailed examination of how power/knowledge is produced and circulated as a force among locally-situated entities than communities of practice theory allows for. Changes in knowledge or practice, that is learning, are not seen as just the result of mental processes (cognitive theories of learning), or even the social negotiation of meaning among individuals (situated learning theory) but are heavily dependent upon the relations between artefacts and technologies shared within the community of practice (Fox, 1999).

### 2.4 Stories of teacher becoming

The previous section examined the literature that theorises practices and the development of practices in a generic sense. This section examines the specific literature on teaching practices and, within that, how teachers develop their pedagogical practices, with a particular focus on what the literature has to say about the development of pedagogical practices for the integration of ICT.

#### 2.4.1 Normative accounts of teacher becoming

There is a substantial body of work that provides normative accounts of how teachers
‘become’ over time, much of it focused on the development of pre-service and early career teachers (Berliner, 1988; Dreyfus & Dreyfus, 1986; Fuller & Brown, 1975; Huberman, 1989; Ryan, 1986). Such models echo strongly one of the most used models of skill acquisition put forward by Dreyfus and Dreyfus (1986) which suggests that professionals, including teachers, move through a set of ‘stages’ from novice, through a survival stage to, eventually, proficiency and expert status. Whilst different models are grounded in different discourses (psychology, information processing) and present slightly different descriptions of the stages, most assume a steady, upward, linear progression through successively higher levels, along predictable timelines.

Critics of such models of teacher becoming argue that they fail to capture the complexity that is teaching (Dall’Alba & Sandberg, 2006; Grossman, 1992; B. Levin, 2003; Mulcahy, 2011). Whilst these models are argued to provide heuristics that help in trying to understand where a beginning teacher’s focus and concern may lie, it is not clear how long an individual teacher may remain in any of these stages or whether the stages are experienced in an invariant sequence (B. Levin, 2003). Stage theories imply a cumulative development, that is, where earlier stages lead naturally to later stages, however other studies seem to contradict this easy solution (Grossman, 1992). Huberman (1989) retained the notion of stages of development, but recognised that trying to delineate teacher development as a discernible sequence of phases is problematic. It may be that some stages are experienced so fleetingly, or not at all, as to be irrelevant to some teachers whilst other teachers may take a considerably long time to pass through a particular stage, or fail to ever progress. Teaching is not necessarily a linear trajectory, but such models do not accommodate the idea of teachers taking alternative or even multiple trajectories of participation (Mulcahy, 2011). Further, stage models of development direct attention away from the skill that is being developed and overlook ideas of understanding a practice as being enacted in and through practice (Dall'Alba & Sandberg, 2006).

**2.4.2 Alternative accounts of teacher becoming**

‘Stage’ models of teacher becoming also assume that proficiency in a practice involves the accumulation of progressively more advanced knowledge and skills through formal and informal training (Dall’Alba & Sandberg, 2006). But the idea that a practice can be thought of as a defined body of knowledge that is largely fixed and stable has been questioned (Bill ett, 2001; Grossman, Hammerness & McDonald, 2009; P. Webb, 2009) and it as odds with more situated, performative and relational views of developing a practice outlined in earlier
sections of this Chapter. The debate over teacher knowledge that has been played out in the literature over the last three decades centres around whether, and to what extent, teacher knowledge can, on the one hand, be codified and generalised or, on the other hand, is an endemic form of knowledge, that is practical, crafted, situational, episodic, content-determined and context-dependent (P. Webb, 2009). The emphasis on teacher knowledge, particularly attempts to codify teacher knowledge in terms of pedagogies needed for specific discipline domains (Shulman, 1987) has tended to obscure the complexity of work that is teaching, and obscured important aspects of teaching that cross discipline boundaries (Grossman et al., 2009).

The view of teacher becoming as performative, that is, resulting from the actual doing of teaching is supported by Clandinin (1992) who argues that teacher knowledge is a kind of knowledge, carved out of and shaped by, situations; knowledge that is constructed and reconstructed as they live out their stories.” (p. 125)

According to the literature, the development of pedagogical understandings takes time and is influenced by a range of factors. Levin (2003) in her generative longitudinal study of teachers’ development of pedagogy identified five themes that influenced the thoughts and actions of early career teachers, summarised here:

- Prior beliefs and personal values.
- Professional experiences as teachers (formal teacher preparation, professional development opportunities, and day to day classroom experiences).
- Contexts in which they find themselves teaching – supportive/non-supportive colleagues and administrators, changing schools and political climates.
- Personal relationships both in and out of school – influence of friends, mentors, colleagues and families.
- Other life circumstances – cultural backgrounds, age, gender, children, mental health, changing educational policy environment.

Studies of pre-service and graduate teachers’ use of ICT affirm the importance of these factors, particularly prior beliefs and professional experiences as teachers, in shaping new teachers' pedagogical practices. The following sections examine the literature relating to how beliefs about learning and teaching and the role of ICT might shape the pedagogical practices of teachers, as well as examining the literature on the impact of prior experience on teaching practice, with and without ICT. This is followed by a brief examination of some of the
literature discussing the socio-cultural setting of the school and how this might shape teachers’ use of ICT in their practices. These are key areas that have received significant attention in the research literature relating to teacher integration of ICT.

2.4.3 Beliefs and attitudes about learning, teaching and ICT

There is an extensive body of literature that argues that teacher beliefs are a more important determinant of what teachers actually do in the classroom than teacher knowledge. Pajares (1992) synthesised literature on the psychological construct of beliefs to make the following generalisations about beliefs:

- Beliefs are the personal truths that everyone holds that are formed by an event or succession of events or by chance.
- Beliefs are formed early and tend to self-perpetuate, and the earlier a belief is formed the more difficult it is to alter. They help individuals define and understand the world and themselves.
- Beliefs and knowledge are inextricably linked but beliefs have a stronger affective component, which makes them a filter through which new experiences and information are filtered. This filtering system screens, redefines, distorts or reshapes subsequent thought processes.

Beliefs are therefore instrumental in defining behaviour and organizing knowledge and information.

If beliefs act as filters when people are faced with new information or experiences, then teachers will filter new ideas about pedagogy through their belief systems before they assimilate it into their practice (P. Ertmer, 2005; P. A. Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010). It follows that a teacher’s beliefs about learning and teaching, within their specific discipline (Hancock & Gallard, 2004), and about the role of ICT in the classroom have a significant impact on the implementation of technology in the classroom (M. Cox, 2008; Liu & Szabo, 2009).

A teacher’s epistemological beliefs about learning provide the orientation and motivation for teacher learning (N. Law, 2008). For teachers to integrate new approaches into their practices, including integrating ICT, they must align with teachers’ beliefs about pedagogical practices.

**Beliefs about the role of ICT in learning and teaching**

A number of studies point to the importance of prior beliefs and values around technology as
a determinant of whether ICT is integrated by early career teachers (Albion & Ertmer, 2002; Bai & Ertmer, 2008; Banister & Ross, 2006; Jamieson-Proctor et al., 2006; Judson, 2006; Liu & Szabo, 2009; Teo et al., 2008; Windschitl & Sahl, 2002; Wozney, Venkatesh, & Abrami, 2006). These studies suggest that positive beliefs about the value of ICT in learning and teaching, in particular a belief that ICT can improve learning and teaching, act as a positive influence on early career teachers’ use of ICT (Dawson, 2008). Conversely, where teachers do not believe in the effectiveness of technology then they are less likely to adopt it in their own practices (Albion & Ertmer, 2002).

Beliefs about pedagogy
Teachers’ beliefs about the pedagogy are also necessary to consider. Some studies suggest that teachers will adopt ICT in ways that fit with and sustain their existing pedagogical practices (G. Beauchamp, 2006). For example, some studies have observed that teachers who believe that students learn best through teacher-delivered lectures will tend towards using technology to facilitate this type of learning, whereas teachers who believe in exploratory, student-centred learning would use technology quite differently to support more student-centred learning experiences (Bai & Ertmer, 2008; Judson, 2006; Levin & Wadmany, 2005). The binary between teacher-centric and student-centric ICT-based pedagogies will be explored in more depth in section 2.5.1. The point here is that the literature suggests that if integrating ICT requires teachers to adopt new pedagogical practices that are not aligned with their beliefs about learning and teaching, they are unlikely to integrate technology into their own practices.

Beliefs about own abilities
Another important set of beliefs that influence or shape the extent and nature of a teacher’s use of ICT in their teaching practice is their belief in their own ability to use ICT. Bandura (2000) argues that belief of personal efficacy is the foundation of human agency, that is, unless people believe that they can produce desired effects by their actions, they have little incentive to act. Self-efficacy is based on beliefs about what a person can accomplish with the skills and knowledge they already possess (Jones 2002). Teachers who are confident in their ICT abilities develop much more positive attitudes to the integration of ICT than those who are less confident or resistant (Ertmer et al., 2003; Lee & Tsai, 2010; Yuen & Ma, 2008). A large scale study of Canadian primary and secondary teachers found that personal use of technology outside of teaching was the most significant predictor of teacher use of technology in the classroom (Wozney et al., 2006). Further, teachers who believed they had the skills to
implement computers successfully were most likely to be characterised as high end users of ICT (Wozney et al., 2006). This suggests that it is necessary that graduate teachers believe they have the capacity to use ICT effectively in their own classrooms, not just use technology in their personal lives. If teachers do not believe they have the technological knowledge, the skills and confidence to use ICT then they are unlikely to attempt to integrate ICT into their teaching practice.

It is also important issue to consider is that beliefs are generally held to be static and not easily changed (Hennessy et al., 2005; Pajares, 1992). Windschitl and Sahl (2002) found in their ethnographic study of teachers’ use of laptops that it is not easy to change teachers’ beliefs about learning and teaching. Albion and Ertmer (2002) similarly claim that teacher beliefs are not easily changed (Albion & Ertmer, 2002) and that changes in beliefs tend to follow changes in behaviour, rather than precede them (Gusky, 2002; Pajares, 1992). That is, teachers do not believe it until they see it. Changes in belief are influenced most strongly by personal success in the relevant domain, through prolonged and deeply engaging experiences (N. Law, 2008) as well as by vicarious experiences, that is, seeing success occur in others that allows for comparison with our own experiences (Pajares, 1992). However, teachers have traditionally had limited opportunity to observe other teachers’ practices suggesting that opportunities for supporting and celebrating experimentation with new approaches to integrating ICT are important in helping to shape teachers’ beliefs and self-efficacy in relation to ICT (Albion & Ertmer, 2002; Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010).

Most importantly for this study, beliefs about teaching are thought to be well established by the time a pre-service teacher gets to university (Bai & Ertmer, 2008), often resulting from a critical incident or inspirational teacher from the pre-service teacher’s own schooling experiences. Research also suggests that the values and beliefs about the role that ICT might play in learning and teaching are influenced by the folk pedagogies (Bruner, 1996) around the use of ICT which graduate teachers experienced in their own schooling experiences (Bai & Ertmer, 2008; Banister & Ross, 2006). Images of self-as-teacher developed during pre-service teacher education, or even beforehand, have a lasting impact on the use of ICT in the classroom teachers (Pierson & Cozart, 2004) since beliefs act as a template for that pre-service teacher’s own teaching practices (Pajares, 1992). These claims form the basis for calls in the literature to address beliefs about integrating ICT during pre-service teacher education through more innovative and immersive programs that explicate and challenge existing beliefs (Brown & Warschauer, 2006; Ertmer & Ottenbreit-Leftwich, 2010; Hofer, 2005).
A contrasting view is presented in a study by Levin and Wadmany (2005) that demonstrated that teachers could change their beliefs about the role of ICT in pedagogical practices. However, it required teacher to be open to reflecting on their previous practices in light of new experiences over an extended period, that is, change in beliefs does not happen quickly (G. Beauchamp, 2006; Levin & Wadmany, 2005). A more recent study suggests that the ‘digital native’ characteristics of students can act as a force in changing some teachers’ beliefs about the role of ICT in the classroom, where students’ demand for using technology pushes teachers into trying to integrate ICT (Gao, Choy, Won, & Wu, 2009).

The relationship between teachers’ pedagogical beliefs, self-efficacy and how they ultimately use ICT in their classrooms is complex. Other studies suggest that the relationship between pedagogical beliefs and how ICT is used in the classroom is much more problematic (Gao et al., 2009; Judson, 2006; So & Kim, 2009). Even where teachers have a sound pedagogical understanding and may accept the benefits of integrating ICT and have reasonable technological knowledge, these studies suggest that it is difficult to translate beliefs and knowledge to create pedagogically sound learning experiences that integrate ICT. So and Kim (2009) question whether pre-service teachers can translate their beliefs and propositional knowledge about ICT into a pedagogically sound lesson package when they generally lack an intimate connection between beliefs, knowledge and actions, and they lack a repertoire for teaching with technology. These studies showed a misalignment between what teachers reported their pedagogical beliefs were and how they ultimately made use of ICT in their teaching practice, that is, they suggest a gap between the espoused beliefs about the role that ICT might play in learning and teaching, and the actual use of ICT-based pedagogical practices.

The importance of beliefs in shaping pedagogical choices and in shaping suggests that any examination of graduate teachers’ practice should include an examination of their beliefs about learning and teaching, as well as their beliefs about the role of ICT in the classroom (Palak & Walls, 2009).

### 2.4.4 Professional experiences as teachers

Other research that examines factors that might shape the beliefs about ICT of graduate teachers, identifies the extent and nature of ICT modelling in pre-service teacher education (Hancock & Gallard, 2004; Otero et al., 2005; Pope, Hare, & Howard, 2002); and the degree to which pre-service teachers experience or observe effective use of ICT whilst on their practical teaching placements (Albion, 2003a; Albion & Ertmer, 2002; Kadjer, 2005;
A recent study suggests that Australian pre-service teachers have varied experiences of seeing ICT used in their own schooling, in their own pre-service teacher education and whilst on practicum and that the majority is not experiencing transformative integration of ICT in these spheres (Moyle & Owen, 2009). The findings from a recent small-scale study of undergraduate primary pre-service teachers (Carr, 2010) reinforce contentions made in the literature that most pre-service teachers have had limited previous exposure to effective integration of technology, and in some cases limited experience of student-centred learning (D. Brown & Warschauer, 2006; Moyle & Owen, 2009; So & Kim, 2009). For the majority of pre-service teachers in Carr’s study, their own experiences with ICT in a school setting have been limited to word processing, researching on the Internet and preparing presentations, with limited use of interactive whiteboards observed.

The lack of direct participation in and observation of transformative ICT-based pedagogical practices is exacerbated by the pre-service professional placement experiences of many pre-service teachers. Teacher education providers have reported that many schools are inadequately prepared for ICT delivery (in terms of resources, expertise and classroom practice) for pre-service teachers to undertake their professional experience. This under-preparedness meant that schools do not provide rich opportunities for pre-service teachers to develop skills to integrate ICT successfully into the curriculum as part of their classroom practice (Pegg, Reading & Williams, 2007). Many of the pre-service teachers in Carr’s study (2010) were seeing technology used whilst on professional placement essentially as a ‘babysitting’ device to occupy students when they finish their ‘real’ work, or as a publishing tool to produce a ‘good copy’. Such uses hardly provide an effective model that might inspire pre-service teachers to translate their skills to pedagogically sound lessons (So & Kim, 2009). Indeed, in a study of the integration of ICT in pre-service teachers, teachers and teacher education in Australia, school systems reported that many newly-qualified graduates often did not have the necessary ICT skills and understandings required for effective teaching in their classrooms (Pegg, Reading & Williams, 2007). Schools noted that pre-service teachers were often disinclined to consider any ICT initiatives in their teaching. Further, there were pre-service teachers with high technical competence but who were unable to use that knowledge for teaching across or within subjects. Also, there were others who had many ideas about ICT applications within the curriculum but lacked the personal technology skills to carry out their plans in the classroom (Pegg, Reading & Williams 2007).
This study will investigate the graduate teachers’ experiences of ICT integration in their own schooling and in their pre-service teacher education and the influence such experience may have on their pedagogical choices when integrating ICT.

2.4.5 Cultural contexts

One of the issues discussed in the literature about some of the earlier studies that investigated teachers’ beliefs about ICT is that they based their research on self-report and quantitative approaches only, or located their studies in technology-rich schools (Palak & Walls, 2009), ignoring the notion that what teachers believe is often shaped by the institutional cultures and social contexts in which teachers operate (Bate, 2010; Lim, Lee, & Hung, 2008; Windschitl & Sahl, 2002). Goos (2005) also point out that studies that rely on influences such as beliefs and prior experiences to explain new teacher socialisation are too static and decontextualised to adequately describe the mis-match between espoused and enacted theories, particularly in relation to integrating ICT (Goos, 2005). Rather, she proposes, “teachers’ learning is better understood as increasing participation in socio-cultural practices that develop their identities as teachers” (p. 37). That is, studies that examine how recently graduated teachers develop their ICT-based pedagogical practices need to “consider the possible relationships between the setting, actions and beliefs and how these might change over time or across different classroom or school contexts” (p. 39).

Somekh (2010) also sees the integration of ICT as much as a social process as it is a technical process, yet much of what has occurred in schools to date and in policy has related to the technical aspects of technology integration – the procurement and installation of equipment and networks. Somekh sees ICT as cultural tools that mediate human activity and enable new ways of doing things, but that the affordances of ICT are latent until individuals and groups discover how to embed them in new practices. However, developing new ICT-based pedagogical practices, according to Somekh, requires imagining what might be possible with ICT. Somekh draws on a range of socio-cultural theories to argue that ICT-based pedagogical practices are socially constructed and that changes to ICT-based pedagogy requires changes in systems and practices across a school, not just at the teacher level.

Thus, this examination of the literature suggests that any study of how graduate teachers develop their ICT-based pedagogical practices should examine the role that the social and institutional context has on shaping beliefs about the role of ICT in learning and teaching, the pedagogies they use to integrate ICT and their identity as teachers.
2.5 Pedagogies for ICT integration

I now want to turn to the literature on pedagogies for ICT integration. Given that the aim of this study is to examine the ICT-based pedagogical practices of a small group of graduate teachers, it seems important to define what pedagogies for ICT integration, or ICT-based pedagogical practices might look like. This section of the literature review discusses the literature that helps us to understand ICT integration in the classroom.

ICT in a classroom, of itself, does little. The totality of the environment, including the teacher, the students and other resources, and how these are brought together to create opportunities for learning, are what enables the features of ICT to be realised. In other words, it is the pedagogies that are used and the context in which they are used that influence how ICT might be integrated into learning and teaching. The following sections examine the literature on pedagogies that support ICT integration.

2.5.1 Transformative ICT integration

As discussed in section 2.4.3, teachers’ beliefs about learning and teaching will shape their choice of pedagogical approach and hence the way in which they use technology in their classrooms. Teachers make choices based on a particular set of pedagogies or vision for teaching and learning (ten Brummelhuis & Kuiper, 2008).

There is a strong tendency in the literature around pedagogies associated with ICT integration to set up a binary where teacher-centred and student-centred pedagogies oppose one another. Teacher-centred pedagogies are aligned with ‘traditional’ approaches, where the teacher has greater control over what is being learned, how it is being learned, and at what pace (generally homogenised); learning is done individually; whole class instruction is the norm and knowledge is seen as reproductive, something to be transmitted from teacher to student and reproduced by the student (Voogt & Pelgrum, 2005). This pedagogical approach is reflective of Friere’s banking model of education, or seen as pedagogy for an industrial age (Voogt & Pelgrum, 2005). Examples of ICT use in such pedagogies would include using ICT to support the transmission of information, or ‘skill and practice’ software to reinforce skills and knowledge (Cook, 2010). However, within the ICT literature, there is a tendency to associate the effective integration of ICT with more innovative, student-centred pedagogical approaches (Groff & Mouza, 2008; Hinostroza, Labbe, Lopez & Iost, 2008) that reflect more constructivist views of learning (Cook, 2010; Dede, 2008; Voogt & Pelgrum, 2005).

Two key studies, Error! Hyperlink reference not valid.Kozma (2003) and Cox & Webb
(2004) suggest that the most effective integration of ICT occurs in conjunction with pedagogical practices that:

- placed a strong emphasis on collaborative learning
- shifted the locus of control from the teacher to the student and promoted active and independent learning in which students took responsibility for their own learning, set their own learning goals, created their own learning activities and/or assessed their own progress and/or the progress of other students
- engaged students in project-based learning in which they worked on complex, extended, real world problems or projects
- provided students with competencies and technological skills that allowed them to search for, organise and analyse information, and communicate and express their ideas in a variety of media forms
- provided students with individualised instruction customized to meet their needs in terms of different entry levels, interests, or conceptual difficulties.
- addressed issue of equity for students of different genders or ethnic or social groups and/or provided access to instruction or information for students who would not have access otherwise because of geographic or socio-economic reasons.
- ‘broke down the walls’ of the classroom, for example, by extending the school day, changing the organisation of the class, or involving other people (such as parents, scientists or business professionals) in the education process.
- improved social cohesiveness and understanding by having students interact with groups and cultures they would not interact with otherwise

These and more recent studies into ICT-based pedagogies are describing pedagogies that reflect strongly socio-cultural epistemologies and social constructivist theories of learning. A key pedagogical question they focus on is the extent to which learning activities are under the control of the teacher or under control of the student (ten Brummelhuis & Kuiper, 2008). These pedagogies place the students at the centre of the learning experience, rather than the teacher. They are approaches that give more responsibility for learning to the students, rather than emphasise the information transmission role of the teacher. The studies claim these approaches foster discovery, creation, creativity and active learning by the students, rather than preserve the passivity of more traditional classrooms. Learners are, presumably, building
upon prior knowledge to construct their own perspectives and understandings through new experiences. These approaches make extensive use of social interaction, within and beyond the classroom, to support a more social approach to learning. The teacher’s role in such approaches shifts from dispensing knowledge to assisting students or learners to construct viable conceptions of the world, that is as an engager and facilitator of thinking, rather than simply a delivery vehicle of information (G. Beauchamp, 2006; Dede, 2008; Jonassen, Howland, Marra, & Crismond, 2008). The findings from these studies claim, overall, that pedagogical approaches that are more student-centred and which support more constructivist ways of learning may be more effective than ‘traditional’ pedagogical approaches in realising the promise of ICT in learning and teaching and equipping students with 21st century skills (Kozma, 2003).

It could be argued that such pedagogical approaches represent best practice teaching, regardless of whether ICT is used or not. Indeed, such approaches could be criticised for confining the discussion of ICT pedagogies to those established practices, albeit best practice or innovative teaching practices that reflect participationism as opposed to acquisitionism as the preferred metaphor for learning (M. Webb, 2013).

However, it is claimed that digital technologies, ICT, represent a paradigm shift in how we understand knowledge and what counts as knowledge. ICT is contributing to substantial changes to the social and cultural contexts in which learning occurs and thus, it might be argued, how people learn, and use technology to support their learning, also changes (Beetham & Sharpe, 2007). For example, the focus on a pedagogical binary downplays the potential of ICT to support a wider range of learning through emerging practices such as:

- using different forms of ICT to represent knowledge in different ways, rather than reliance on written text forms of knowledge representations (Hedberg, 2008; Levy & Kimber, 2009; Towndrow, Brudvik & Natarajan, 2009)
- using ICT to build and represent new concepts (Hedberg, 2008)
- promoting computational thinking, a form of problem-solving based on computer science methodologies (Resnick, 2007)

New modes of learning that are emerging from analysis of peer-to-peer learning using social networking suggest that learning occurs between several sites of engagement, individually and collectively, and that learners’ multiple membership of communities provides expanding access to distributed knowledge bases (Ryberg & Christiansen, 2008). Teaching, it is argued,
can no longer be restricted to spatial and temporal boundaries since learning, and teaching, can be anywhere and anytime (van't Hooft, 2008). This mode of learning poses substantial challenges for existing models of pedagogy (M. Webb, 2013) where the boundaries between teacher and student blur (van't Hooft, 2008).

The creation of such a binary between teacher-centred pedagogies and student-centred pedagogies that pepper many studies into ICT integration (Andersson, 2006; Palak & Walls, 2009) is problematic on at least two further fronts. First, it overlooks the ambiguities and different interpretations associated with constructivism and how ‘doing constructivism’ in a classroom takes a variety of different forms (M. Brown, 2008). Second, a binary tends to ignore the complexity of what actually occurs in a classroom. Teachers often employ a mix of pedagogical approaches along a spectrum, rather than a simplistic choice between ‘traditional’ or ‘innovative’ pedagogical approaches, suggesting a variety of methods is more appropriate (Bate, 2010; Sfard, 1998). There are times when transmission of knowledge, whole class instruction and individual learning is what is called for, and there are times when more student-centred, collaborative, open-ended approaches are also called for, and times when a range of approaches in between is required. ICT can and is used to support a range of pedagogies (Hinostroza et al., 2008) along this spectrum from fully teacher-centred to fully student-centred approaches.

Further, the perpetuation of the binary approach confines discussion to existing pedagogies and theories of learning, whereas transformational use of ICT suggests the development of new pedagogies that reflect emerging understandings about how we learn in increasingly digital environments. Dede (2008) argues that no one way of integrating ICT into the classroom is the way:

the apparently endless search for a universal method of teaching and learning that is best for all types of content, students and instructional objectives. Parallel to this is a perennial belief that each new interactive medium is a ‘silver bullet’ for solving education’s problems, despite evidence to the contrary. (p.59)

More recent research, based on more complex understandings of pedagogy, provides alternative ways of conceiving ICT pedagogies in order to investigate, analyse, understand and evaluate teachers’ pedagogy and pedagogical practices (M. Webb, 2010) and it is to those models that I now turn.
2.5.2 The TPACK Model

The most significant of these in recent years, or at least the one that has the most currency, has been the development of the concept of technological pedagogical content knowledge (TPACK). Mishra and Koehler (2006) introduced TPACK as a theoretical framework for conceptualising the relationship between technology and teaching that is being widely taken up in the literature and is creeping into Australian policies that focus on the integration of ICT into education. For example, the Teaching Teachers for the Future initiative uses the TPACK model as its base:

ICT is also transforming pedagogy by providing new ways to learn. The digital resources have been created following the TPACK learning framework which links technology, pedagogy and content knowledge. (Department of Education Employment and Workplace Relations, 2011)

The TPACK model extends Lee Shulman’s generative theory of pedagogical content knowledge that illustrates the complex and interconnected nature of teacher content knowledge and pedagogical strategies (Hofer & Swan, 2008). Pedagogical content knowledge (PCK) represented the simultaneous consideration of content and pedagogy and the synergy between the two (Hofer & Swan, 2008), and considers “how particular topics, problems or issues are organised, represented, and adapted to the diverse interests and abilities of learners, and are presented for instruction” (Shulman, 1987, p.8).

Mishra and Koehler argue that technological knowledge has been treated largely as independent and separate from other forms of teacher knowledge, whereas, to produce effective teaching with technology, focus should be placed on the synergies and dynamic interconnections between technological, pedagogical and content knowledge (Koehler & Mishra, 2008; M. Law, 2008; Mishra & Koehler, 2006; M. Webb, 2010). Further, attention needs to be placed on all areas of intersection between technology, content and pedagogy (Hofer & Swan, 2008). That is, teachers need to:

- know the content of what they teach (CK)
- have a generic understanding of the processes and practices of teaching (PK)
- have understanding and mastery of specific technologies (TK)
- have understanding the challenges students are likely to experience as they learn the content (PCK)
• know which technologies are best suited to different subject matter (TCK)
• know how teaching and learning might change with the use of particular technologies (TPK) (Koehler & Mishra, 2008).

TPACK represents the intersection of all of these and is:

an emergent form of knowledge that goes beyond all three components…a nuanced understanding of the complex relationships between technology, content and pedagogy, and using this understanding to develop appropriate, context-specific strategies and representations. (Mishra & Koehler, 2006, p. 1029)

Whilst the TPACK model has spawned a great deal of recent research (Finger & Jamieson-Proctor, 2010; Hardy, 2010; Jamieson-Proctor, Finger, & Albion, 2010; Lee & Tsai, 2010; Phillips, 2011) there are critics of the approach. One difficulty, acknowledged by the proponents of the model (Harris et al., 2009), is that boundaries between each category of teacher knowledge are blurry rather than clear and distinct, suggesting that attempts to specify each element may generate definitional ambiguity and contestability (Angeli & Valanides, 2009). In particular, the rapid pace of new technology development creates a highly dynamic and uncertain scenario, which has implications for their technological knowledge and hence for their TPACK (Hinostroza et al., 2008). Further, TPACK gives equal weight to all three forms of knowledge, which is perhaps questionable.

TPACK provides a very useful theoretical schema for thinking about the relationships between different areas of teacher knowledge, and how these elements of teacher knowledge need to interact if teachers are to develop effective pedagogical approaches using ICT. However, Harris, Mishra and Koehler (2009) themselves recognise that content, pedagogy and technology co-exist, constrain and create each other in complex ways and they warn that ignoring the complexities can lead to oversimplified solutions. The TPCK framework does not take into account factors other than pedagogy, content and technology, such as teacher beliefs about learning and teaching (Angelis & Valanides, 2009) or the very personalised and contextualized nature of technology integration for teachers (Hoffer & Swan, 2008). Teacher knowledge of any description is affected by the contexts in which that knowledge is situated and by the relationships among people, places and things within that context, at that time, and in that place (Clandinin & Connelly, 1995). Further, critics of attempts to codify and generalize teacher knowledge, of which TPACK is an example, argue that such codifiable paradigms fail to recognise the political contexts in which teacher knowledge is developed,
practised and contested, that is they ignore how power is used and circulates within a school and how this affects pedagogical choices made by teachers (P. Webb, 2009).

Whilst TPACK enjoys a high profile as a model of ICT-based pedagogical practices, others in the field offer alternative perspectives that reflect a more complex conception of pedagogy and that factors that might influence pedagogical choices. Growing knowledge about learning and teaching, and ICT, increases the complexity of our understandings of pedagogies. Details of context, content, age and stage of learners, purposes of learning, the communities within which learning takes place all impact on, shape and are shaped by pedagogies (Webb, 2010).

2.5.3 Alternative models of ICT pedagogy

ICT integration as a socio-cultural activity

Somekh (2010) sees the integration of ICT in schools as a social practice. She argues that models and initiatives that conceptualise ICT integration narrowly, for example in terms of teacher knowledge or school reform, ignore how social practices develop and become embedded in socio-cultural activity systems. Somekh sees ICT as tools that mediate human activity, but their affordances remain latent until people find ways to embed them in new social practices. Making use of the affordances of new tools depends upon the development of a vision of what might be possible. Vision and skill are therefore essential before tools can mediate new actions.

Capacities, not just knowledge

Law (2008) argues that a conceptualisation of what it takes for teachers to effectively integrate ICT into their pedagogical practices needs to go beyond a focus on teacher knowledge, in whatever form, that is necessary during classroom practice. She suggests that for ICT integration to be effective teachers need to move beyond using ICT to sustain or strengthen current pedagogical practices, that is learning *with* ICT, to integrate ICT in ways that *disrupt* or *subvert* current pedagogical practices, to create new pedagogical practices. In this sense, it is not just the subversive nature of the technology that may be significant, but the practices that surround the technology. These include the learning objectives, the role(s) of the teacher, the role(s) of the learner, the nature and sophistication of the ICT used, the degree to which the classroom is connected (not just in a technology sense but connected to other people and places via technology) and the learning outcomes (N. Law, 2008).

In Law’s view, TPACK is not sufficient to ‘leverage ICT’ for innovative pedagogical
practices, and that to use ICT effectively, that is, in ways that are transformative, teachers need additional capacities not discussed in the TPCK model.

Her analysis of examples of best practice use of ICT suggests that in pedagogical innovations teachers need to learn new content knowledge (CK) as they set authentic, open-ended problems for students to work on, which tend not to have standard answers. She argues this requires not only cognitive but metacognitive capacities on the part of the teacher. Further, such innovations are often planned and conducted in collaboration with other teachers and people outside the school, and involve different relationships with students who may in fact teach the teacher. Teachers therefore need also to have social capacities to cooperate and communicate with others – identifying, enrolling and collaborating with others who have the necessary content and or process knowledge. In addition, teachers working collaboratively need social-metacognitive capacities that are required for knowledge building in a community (Scardamalia, 2002), to work in more reflective and connected ways with colleagues.

Finally, to leverage ICT in such innovative and transformative ways, Law argues that teachers need courage and motivation, a social-emotional capacity, to teach in ways they were not taught. That is, to integrate ICT in ways that are transformative, subversive or disruptive that results in new practices, teachers need more than knowledge. They need a range of capacities that support their risk taking.

**The importance of setting**

Kennewell (2008) focuses on analysing learning and teaching with ICT by examining the features of the setting as well as features of the learner, thus acknowledging that pedagogical practices can be influenced by factors other than teacher knowledge. In Kennewell’s model, the setting includes:

- the beliefs, values and behaviours the teacher brings
- the cultural factors including things like school ethos, policies, subject cultures
- tools and other resources, including ICT tools, language or physical tools.

Kennewell’s model highlights two further areas that are not considered in TPACK – the affordances and constraints of the technology itself, and the role of the students in shaping a teacher’s choices about how ICT is used. Kennewell argues that students’ actions where ICT is used are, at times, subversive, and that responding to students’ actions influences choices about ICT. Whilst acknowledging the role that the setting can play, and in particular, the role
that students can play in shaping the pedagogical choices of teachers, Kennewell’s model skims over the detail of what a teacher might bring.

**Distributed pedagogies**

Webb (2010, 2013) suggests that the limitations of the TPACK model can be overcome by reconceptualising pedagogical practices as constituting a broader range of elements that interact in iterative processes.

Webb’s model of pedagogy for ICT tries to account for the complexity of teaching and extends far beyond notions of teacher knowledge, however that is framed, to incorporate a more distributed model of pedagogy that accounts for the processes, internal and external to teachers and to students, that occur in learning environment.

A key feature of Webb’s model is the suggestion that effective pedagogies for integrating ICT require the enrolment of students in the pedagogical reasoning process. She contends that students also have technological knowledge that, at times, may be more extensive than the teacher’s technological knowledge. Further, the students may also have greater knowledge of what ICT resources may be more appropriate or preferred for different tasks. Webb argues that students therefore have an important role to play in the pedagogical reasoning about ICT integration, that is, the pedagogical choices are distributed between teacher and students.

Webb’s model also incorporates resources, including lesson plans, assessment data, teacher resources and the IT resources in the classroom which are both inputs to the teacher’s pedagogical reasoning and the learning interactions that are generated in the classroom, as well as the products of teachers’ pedagogical decision making. In other words, the model recognises that pedagogy influences and is influenced by social and material elements within a classroom.

This model more closely reflects the dynamic nature of classrooms, where multiple elements are in play simultaneously. However, this distributed model of pedagogical practices depends on teachers explicitly including support for students to be metacognitive as well as being dependent on the teacher’s ability to formatively assess students and to respond in the moment, that is, to engage in ‘hot action’, responding in the moment to the contingent situations that arise. A teacher’s ability to do this effectively may vary, particularly according to age and experience.

Examining these models of ICT-based pedagogical practices can, to a point, help guide investigation, analysis and understanding of what occurs in the classroom when ICT is being
integrated. TPACK provides an abstract level of conceptualising teacher knowledge (N. Law, 2008), but its abstraction does little to assist understanding the variety of factors that are in play in the classroom. Law and Webb provide frameworks that help extend how we think about pedagogical practices for ICT integration that move beyond a focus on teacher knowledge to incorporate teacher capacities as well the dynamic and complex nature of the classroom. Socio-cultural approaches to ICT-based pedagogies such as those put forward by Somkh suggests that consider factors beyond the classroom are worthy of consideration as well. This study will therefore look beyond teacher knowledge as a factor that shapes the development of ICT-based pedagogical practices of recently graduated teachers.

2.6 A word on theory

The world, particularly the social world, is a messy reality – it is not neat and well-ordered and therefore at times it becomes difficult to study. To do so we enlist the services of theories to help us make sense of all the messiness and complexity, to throw light on the world or the aspects of the world under study. This chapter has presented theoretical perspectives on practice. However, while theories provide us with a conceptual lens through which we view the world, they are, by their very nature, simplifications of what is often a rather messy reality and guide us in what we pay attention to, to what is relevant and what is not relevant (Mishra & Koehler, 2006).

The messiness of reality seems to increase whenever technology is added to the equation. That makes it difficult for a single theory to cover everything. As Amin and Thrift point out “no particular theoretical approach, even in combination with others, can be used to gain a total grip on what’s going on” (Amin and Thrift in Selwyn, 2011, pp. 48-9). Further, Selwyn argues it is important to recognise that there is no one correct theoretical stance to adopt when looking at schools and digital technology. Individual theories, including those that are used in this study, can be criticised and challenged on particular points. The theories presented here highlight the importance of a deep understanding of the social. Social shaping approaches, rather than focusing on the technology specifically, are significant in providing a way in to understanding the “often unseen, mundane, prosaic and often perfumery social processes which underpin the use of digital tools and applications in school settings” Selwyn, 2011, p. 49).

Gherardi (2006) argues that there is no unified social theory of practice but that some traditions of research can be grouped under the heading of practice-based theorizing on
learning and knowing in organisations. Communities of practice, activity theory, and Actor Network Theory all share a focus on practice as situated. Each has strengths, but they also have omissions and limitations. Gherardi’s concern, and mine, is not to combine all of these perspectives into a single framework, but to show that practice-based theorizing arises from multiple perspectives. This way of viewing through multiple lenses challenges the notion of a single, authoritative narrative and allows for various possibilities.

Rather than debate theoretical differences any further, this study will treat the unresolved differences as empirical, and to assume that in different contexts different answers will be yielded. So that is where this study is situated – an empirical examination of how a small group of recently-graduated teachers learn ICT-based pedagogical practices within the specific context of a school and in doing so establish their identities.

2.7 Chapter summary

My examination of the literature has shown that recent national and state education policies position ICT as a vehicle for transforming learning and teaching. Yet, despite continued investment in ICT in schools, there remains a significant gap between the policy rhetoric and the reality of ICT integration. The literature in section 2.2 suggests that, despite the popularity of arguments that the current generation of ‘digital native’ teachers will overcome the aforementioned gap, growing up in an ICT-enriched world is unlikely to be sufficient to ensure the integration of ICT that transforms the learning experience in school classrooms. This study is therefore focused on examining the pedagogical practices of graduate teachers with respect to their use of ICT in the classroom, and examining how those pedagogical practices develop and are shaped.

This study is informed by situated learning theory (Lave & Wenger, 1991) and Communities of Practice theory (Wenger, 1998) which, in spite of identified shortcomings, have given rise to serious considerations of the sociality of practice; that practices are shaped by the social and cultural contexts in which they are situated (Kemmis, 2010, Beckett, 2011). I have also presented literature in section 2.3.2 that argues that practices impart identities (Gherardi, 2006), that a person’s experiences of and within a practice become incorporated into their identity. The literature suggests that it is important to examine the context in which graduate teachers are placed, in order to unpack the relationship of organisational learning to the building and performing of identity. This study therefore examines how graduate teachers identify themselves within their profession, within the organisation of the school and how this
shapes how they integrate ICT into their practice. How these graduate teachers learn about integrating ICT into their own teaching practices, that is, how the graduate teachers learn within an organisation, the school, makes this research a study of learning and knowing in practice (Gherardi, 2006).

Some (Fox, 1999; Mulcahy, 2011) who are critical of communities of practice as a lens for examining the development of practices, argue that changes in knowledge or practice are not just the result of cognitive processes or even the social negotiation of meaning among individuals, but are heavily reliant on the relations between artefacts and technologies shared within a community of practice. They urge approaches to the examination of practice that take a material, or more accurately, a socio-material turn such as Actor Network Theory (ANT). I have shown (section 2.3.3) that there is common ground between Communities of Practice and ANT - both treat knowledge and learning as highly situated and contextualized; both see knowledge as what is created as a result of relations between actors; both are focused on relational effects or enactment. This study therefore draws on aspects of ANT to surface the importance of materiality, which is largely unproblematised in Communities of Practice theory, and that encourage tracing the effects of the little things that interact with the graduate teachers as they attempt to integrate ICT into their pedagogical practices.

Since the policy rhetoric is focused on transformation through ICT integration, this study is interested in the capacity of the graduate teachers to integrate ICT in ways that are transformative. The role of pedagogy and how it is enacted in the classroom is shown in the literature to be central to the transformative integration of ICT (Mishra & Koehler, 2006; Hennesy et al., 2005), and is central to this study. Current descriptions of innovative or best practice integration of ICT, outlined in 2.5.1, appear to prefer participative pedagogies based on constructivist approaches to learning that are set up in opposition to more traditional, teacher-centred pedagogies. I show that such a binary is unhelpful since it confines discussion to existing pedagogies and theories of learning, whereas transformational use of ICT suggests the development of new pedagogies that reflect emerging understandings of how we learn in increasingly digital environments.

A review of the literature into factors that influence teachers’ ICT integration shows that beliefs, prior experiences and teacher knowledge are important considerations (section 2.4). The TPACK model, which currently enjoys a high profile in the literature, provides an abstract level of conceptualising teacher knowledge with respect to ICT integration, but a review of alternative models of ICT-based pedagogical practices (2.5.3) shows that teacher
knowledge alone is inadequate to explain the complexities of factors that shape the pedagogical choices teachers make when integrating ICT. Examining these models of ICT-based pedagogical practices can, to a point, help guide investigation, analysis and understanding of what shapes teachers’ choices when integrating ICT, but it is through empirical investigation of the choices made by graduate teachers when integrating ICT, and the factors that shape these choices, that will throw light on their capacity to integrate ICT in ways that are transformative.
Chapter 3 – Methodology and research design

3.0 Introduction
This chapter outlines the epistemological and methodological underpinnings of this study. It also describes the research methods adopted for the study – how the study site was selected; how research participants were identified; what sort of data was collected and how it was collected; and how the data has been reduced and analysed. The limitations of the study design are also identified and discussed along with ethical issues and contingencies that arose during the study.

3.1 Epistemological assumptions
In Chapter 2, I argued that policies around the integration of ICT into school classrooms across Australia are seen as less successful than anticipated. Policies are frequently, and appropriately, based on macro-research into social phenomena, that is, large-scale research that attempts to identify overall patterns or big pictures, generalised characteristics and large scale trends - grand explanations of how things work in general (Stake, 2010). However, in grand explanations that are characteristic of macro-research, the particular or the individual is often obscured in the search for the general (Stake, 2010).

Qualitative research, on the other hand, explores the particular by examining the complexities and process that give rise to social phenomena. By developing a deeper understanding of the context in which the policies around the integration of ICT are implemented, by examining the individual or particular cases in a specific school with a specific group of recently graduated teachers, we might throw light upon why successive policies aimed at facilitating the integration of ICT into school classrooms are at odds with practice (Marshall & Rossman, 2011). Given this focus, this study, which examines what shapes the ICT-based pedagogical practices of a small number of recently graduated teachers in a single school, is located within a qualitative research paradigm. Denzin and Lincoln (2005) define qualitative research as:

a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations….At this level,
This study is examining practices, which are a social phenomenon. Thus the approach taken to the examination of practice needs to be consistent with the exploration of social phenomena. Qualitative research stresses the socially constructed nature of reality – it seeks answers to questions that stress how social experience is created and given meaning (Denzin & Lincoln, 2003).

The study takes a constructivist-interpretivist view of how to make sense of the world, reflecting a social constructivist epistemology that stresses the importance of culture and context in constructing knowledge. In a social constructivist view of the world, individual and collective knowledge is constructed through the interactions between individuals and with the environment they inhabit. Truth, or meaning, comes into existence in and out of our engagement with the world (Crotty, 1998, p. 8); as a result of how people experience or interpret an event (Stake, 2010). Meaning is therefore not discovered, but is constructed as a result of our interactions with our world, with the people and the objects that make up the world. Therefore, it follows that different people in different places, from different cultures, and in different times might construct meaning differently since they engage with the world differently.

The theoretical perspective taken in this study is an interpretivist approach, that is, it looks for culturally derived and historically situated interpretations of the social life-world (Crotty, 1998, p.67). It is aimed at developing a deeper understanding about the things at play that shape the ICT-based pedagogical practices of early career teachers. It is not about identifying determinants, or variables that explain cause and effect. It is focused on developing a deeper understanding of what shapes a practice, not explaining what causes a practice – a subtle yet important difference. It is a study that is experientially based, rather than criterially based (Stake, 2010). That is, it is a study that explores a particular episode in time and space, and describes the phenomenon under study interpretively through qualitative evidence. These phenomena arise in one location, with a small group of early career teachers, to deepen our understanding of how ICT-based pedagogical practices of early career teachers are developed within a school. It relies on examining the experiences of the people, places and things being studied (Stake, 2010).
3.2 Ethnographic case study

This study draws on the traditions of ethnography as well as case study. There is an acknowledged lack of clarity in relation to the distinction between ethnography and case study (Yin, 2003). Definitions differ and at times overlap (Walters, 2007). The next sections aim to describe and compare the key features of ethnography and case study respectively, followed by a brief discussion that attempts to draw the two approaches together into what is termed ethnographic case study.

3.2.1 Ethnography

Ethnography, which originated in anthropology, is concerned with the study of what people do, what people know and the things that people make and use (Spradley, 1980). Ethnographic methods of inquiry have expanded from anthropology into a variety of disciplines including cultural studies and education. Ethnography is a holistic study of a social group or culture, a way of examining the cultural behaviours, practices and artefacts of a group of people in their natural settings. The emphasis in ethnography is on discovering, or uncovering the culture of the entity, organisation or group under study (LeCompte & Schensul, 1999a). That is, ethnography is concerned with uncovering what people actually do as opposed to what they might say they do (Murchison, 2010), how people behave, and what structural or contextual features influence their thoughts, behaviours and relationships (LeCompte and Schensul, 1999a).

Ethnographic studies all share a set of common characteristics:

- They take place in a natural setting
- The researcher acts as a participant observer, seeing with an insider’s perspective
- Multiple sources of data are used
- The research process is iterative
- Ethnographies aim for ‘thick’ descriptions and accounts of what is found.

Each of these characteristics is discussed briefly below.

Natural setting

A key feature of ethnographic studies is that they take place in a natural setting. Ethnography takes the position that how people behave, the practices they develop and how they make sense of their world is highly variable and locally specific. The intent of ethnography is to closely observe the everyday lives of the culture under study without contrived settings or
interventions (Le Compte and Schensul, 1999a).

**Participant Observation**

Ethnography aims to learn about how a culture ‘works’ by studying from within the culture, to develop an ‘emic’ or an insider’s perspective, to learn *from* the people under study, rather than studying *about* them (Spradley, 1980; Murchison, 2010). Therefore, ethnography involves the immersion of the researcher, or participant observer, in the cultural space over an extended period of time, observing the people under study, developing a rapport with them to encourage them to talk about what they are doing, thinking and saying as a way of experiencing their world as they do (LeCompte & Schensul, 1999a; Delamont, 2004; Marshall & Rossman, 2011). Adler and Alder (1987, in Angrosino, 2008) developed a typology of participant observation to describe the varying degrees of participation that an ethnographer might assume during their fieldwork:

- **Peripheral member researchers** – researchers whose role is primarily that of observer, who do not participate in the core activities of the group or culture under study, but are still immersed in the cultural setting on a daily or near daily basis.

- **Active member researchers** – researchers who take on some of the functions or activities of the group but without committing themselves fully to the goals and values of the group in addition to an observational role.

- **Complete member researchers** – researchers who are already members of the group being studies or who take on complete affiliation with the group during the research.

For this study, I took on the role of peripheral member researcher. This was largely a passive observer role with little direct participation in the everyday functions of the school.

It is not always possible or practical to ‘live’ in a workplace culture, such as a school, in the ways that traditional anthropological ethnographers would have done. Contemporary ethnographers have modified traditional ethnography to accommodate constraints associated with the study of organisational cultures, particularly in situations where the cultural context or field setting is familiar and where the ethnography focuses on one aspect of the culture under study (Spradley, 1980; LeCompte & Schensul, 1999a). For this study, I visited the school for two or three days per week for most weeks of an entire school year, sitting in the staff room, observing classes taught by the graduate teachers, talking with them and their colleagues to get a sense of how things were done in this school, how the graduate teachers made use of ICT in their classrooms and possible reasons why they made these choices.
Interactive, recursive

Ethnography usually progresses in loops. Frameworks for analysing data emerge from interactions with the research participants, which might give rise to new insights that, in turn, allow for new questions and ideas to be explored as they emerge from the fieldwork (Walters, 2007).

Multiple data sources

Ethnography gathers data from multiple sources and in a variety of forms to generate cultural accounts, for example– interviews, (both formal and informal), observations, fieldnotes, examination of artefacts, and elicitation devices (Walters, 2007).

‘Thick’ descriptions

Ethnographic studies aim to build ‘thick’ descriptions or accounts of the culture under study. Ethnography relies heavily on narrative, or the telling of stories, to build a picture of the beliefs and practices of a community or culture. Stories help us to understand how people they learn to carry out tasks, how they practice their professions, how and how they come to know about their world (Le Compte & Schensul, 1999a). Connelly and Clandinin (1990) argue that “people lead storied lives and narrative researchers describe such lives, collect stories of them and write narratives of experience” (p. 2). In ethnography, stories are told that illustrate and provide examples of the analytical ideas that are central to the ethnography (Murchison, 2010). In the current study, the stories of the graduate teachers and their use of ICT are considered within the context of the culture of the school and are inseparable from it, since practices are so culturally bound.

3.2.2 Case Study

This study can also been seen as a case study. Case study is defined as “an examination of a specific phenomenon, such as a programme, an event, a person, a process, an institution or a social group, using both qualitative and quantitative methods” (Merriam, 1988, p.9). Yin (2003, p. 13) defines case study as “an empirical inquiry that investigates a contemporary phenomenon within its real life context.” (Merriam, 1988)

Case study focuses on an in-depth study of a particular phenomenon, the in-depth examination of a bounded system of some kind (Stake, 1995). Case study, in this sense, refers to the choice of object to be studied, rather than a methodological choice (Walters, 2007).

Case study shares some common characteristics with ethnography – it is an interpretive form
of research, whereby the researcher attempts to identify patterns and themes in the data as a way of exploring the details and meanings of the experiences under study. Case study is also highly situated, interested, like ethnography, in the particular, the specific, the local. Case study also uses many of the same data collection and analysis techniques as ethnography, relying on qualitative tools such as interview, observation, fieldnotes, examination of artefacts, elicitation devices and using multiple sources of data. A key difference is that case study can involve both qualitative and quantitative methods. Another potential difference is that in case study, the setting is not necessarily a natural setting as it is with ethnography (Cohen, Manion & Morrison, 2000). Further, case study can explore a range of phenomena or topics, whilst ethnography is clearly focused on cultural practices and behaviours (Walters, 2007). Finally, case study research is able to take the position of that of an outsider looking in, whereas ethnography is clearly focused on attempting to see the world from the perspective of the insider.

However, case study can mainly be differentiated from ethnography by the focus of the study. In case study the emphasis of the investigation is on the case, situated within the context (Walters, 2007). The context, whilst not ignored, takes a back seat to the case. It is the case that is most important, not the context. In ethnography, it is the culture or social system that is the focus of the study, rather than the individuals that make up the system. Ethnography is interested in generating a holistic view of a culture rather than an in-depth study of a case or set of cases (Walters, 2007).

### 3.2.3 Ethnographic case study

In clarifying the distinctions between ethnography and case study in the context of her own study of the educational experiences of Bangladeshi students in England, Walters (2007) argued that her study was not just a case study, nor just an ethnography, but a combination of the two – an ethnographic case study. Her study was a case study in that it focused on the phenomenon of the small group of Bangladeshi students, the multiple cases she chose as the focus of her study. However, she argued that the children she studied could not be ‘bracketed off’ from the culture and the context that surrounded them, the classrooms and schools in which they were immersed. She argued that “context was not some kind of background noise but was an integral part of constituting who and what the child, or children, were.” (p. 96). Her study was therefore also ethnographic in that it focused as much on the cultural context as on the cases.

Using the term ‘ethnographic’ with ‘case study’ therefore signals that the social system or
cultural group that the case or cases under study are part of is an integral part of constituting who and what that case or cases is (Walters, 2007). In such a study, the case and the context are not separate, but are mutually constitutive.

This study seeks to place the specific practices, the ICT-based pedagogical practices, of a small group of graduate teachers into a fuller, cultural context; to uncover meaning and perceptions of the people involved, the graduate teachers, viewing these understandings against the cultural context of RiverValley Heights High School. My aim in this study is to understand how the graduate teachers make use of ICT in their classrooms and what leads to these practices. I also aim to understand how the culture of RiverValley Heights ‘works’, what the teachers at the school believe and how they work, specifically how they work with ICT in their classrooms and how the way things work within this context might shape the ICT-based pedagogical practices of the graduate teachers. In keeping with the traditions of ethnography, I wanted to learn the culture of RiverValley Heights, carefully watching what people in the school do and say and how they act, that is, to observe the tacit rules of behaviour within the school (Spradley, 1980). My interest lay in describing and analysing patterns of interactions, rituals and the artefacts of RiverValley Heights (Marshall & Rossman, 2011).

3.3 Research design

3.3.1 The research site

Single vs. multiple sites, secondary vs. primary

The study examines the practices of graduate teachers, so a logical starting point is with a group of graduate teachers. As I am a teacher educator, it would have been relatively easy to identify potential graduates from a recent cohort of my own students, but there were also impracticalities and ethical issues involved in this. As their teacher, even though they may have graduated, the power relationship may still have influenced students to accept my invitation to participate in the study out of a sense of obligation, rather than actually wanting to participate in the study for more valid reasons. Further, graduates from any teacher education program are likely to take teaching positions wherever they can secure them, which could mean they may be in very geographically dispersed schools, increasing the travel time necessary to visit the schools. This would leave less time available to gather rich detailed data for the thick descriptions that ethnographic case studies call for. Studying graduate teachers
in a number of different schools or educational settings would also make it difficult to get to understand the way things are done in each school, the influence of other teachers and the socio-material world of each school.

Instead, I chose to locate the study in a single school – where more time would be available to immerse myself in the school, to get to observe and understand how things were done and how the different elements within the school interacted to shape practice.

This study is also located in the secondary school sector. It could just as easily have been located in the primary sector. However, anecdotes from students and my own observations when visiting students on professional placements led me to feel that the take up of ICT in secondary schools was more problematic than in the primary schools I visited. I saw less of it, and my students reported their own observation of its use was very much limited to internet research, word processing essays and an over-reliance on PowerPoint presentations by teachers and students. These were conclusions drawn from a very limited number of schools within a large Australian city, and may not have been reflective of all schools, but at the time represented where my interests lay.

**Selecting a school ‘in the middle’**

My aim in this study was to explore a typical case, a school ‘in the middle’. Many studies of ICT uptake and integration have been situated in schools with a particular focus on ICT as a strategic priority with commensurately high levels of investment in developing the use of ICT (Palak & Walls, 2009). Other research around ICT integration focuses on isolated pockets of leading edge use of ICT with a particular teacher (Palak & Walls, 2009). Another body of research focuses on the implications of the gap between those who have access to ICT in schools and those who do not and the implications for education (Palak & Walls, 2009). The focus of the research in this study was to look at a more ‘typical’ case – a school, like the majority of public schools across Australia, that has no special funding or focus on integrating ICT but that is trying to meet system-wide expectations of integrating ICT within normal budgetary, policy and resource constraints. A school where there is very limited access to technology would remove the opportunity for teachers to attempt to integrate ICT, therefore I needed a school with a reasonable level of access to ICT resources, where ICT was seen as important, but not the main driver of school strategy.

The traditions of ethnography and the time it takes for pedagogical practices to develop, suggest immersion in the place of study over a prolonged period in order to develop a deep
understanding of the culture of the place being studied and to examine changes in pedagogical practices. These considerations suggest that I needed to be immersed in the research site for an extended period. However, the majority of graduate teachers in Victorian Schools are employed initially on short term contracts, many of these for 12 months or less (Australian Education Union, 2007), suggesting that at least some of the original cohort of graduate teachers in the study would not be teaching at the same school in subsequent years. Further, ethnographic research can be seen as an imposition so I needed to find a school where the Principal would be supportive of this research method. For these reasons I decided to be in the field for a school year.

The selection of the school therefore became important. I needed to identify a school ‘in the middle’, a school that had a large intake of graduate teachers that could represent a pool from which to draw potential research participants and a school that was happy to accommodate an ethnographic researcher for the term of the study. On a practical note, I needed to locate a school within reasonable distance of my home and work base to minimise travel time and maximize time in the research site.

A short list of six possible schools was drawn up, based on advice from the Victorian Department of Education and Early Childhood Development’s relevant Regional office and anecdotal advice from a retired Assistant Principal from a local secondary school who knew the region well. Introductory emails and letters were sent to the Principals of each shortlisted school asking them to consider accommodating the study. Despite follow up emails and telephone calls to all six schools during December 2007, only one school agreed to consider the study. A meeting with the Principal in January 2008 confirmed RiverValley Heights High School as the study site.

3.3.2 Research participants – selection and recruitment

The graduate teachers in this study were also to be typical – there was to be nothing particularly special about any of the teachers who participated in the study. There were no particular characteristics I was looking for – I did not want to choose the teachers based on their superior technical or pedagogical skills, or their particular subject area, or their age, or gender or any other criteria. I wanted to explore recently graduated teachers. They could be older, younger, male or female, teaching in a variety of disciplines, with or without strong technology skills.

The selected school had nine graduate teachers on staff at the beginning of the data collection
period, four first-year-out teachers, three second-year-out and two fourth-year-out teachers. This represented a pool of nine potential graduate teachers who could participate in the study. The Principal, at his choosing, personally approached each of the teachers about their interest in participating in the study. A plain language statement describing the research project and outlining the expectations of research participants was provided to each graduate teacher, along with informed consent forms. Three first-year-out teachers and two of the second-year-out teachers agreed to participate in the study. Participants are listed in Table 1.

A meeting was held with the researcher and the five graduate teachers at the beginning of the school year to outline the study in more detail and to arrange a schedule of initial data collection. Mindful of the pressures on beginning teachers, all participants were reminded that they were able to withdraw from the study at any time, for any reason. For all of the graduate teachers in this study their appointment at RiverValley Heights High was their first teaching position.

Table 1: List of participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pseudonym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate teacher 1, female, mid 20s, 2nd year out</td>
<td>Louise</td>
</tr>
<tr>
<td>Graduate teacher 2, female, mid 20s, 1st year out</td>
<td>Lisa</td>
</tr>
<tr>
<td>Graduate teacher 3, female, early 20s, 1st year out</td>
<td>Kerrie</td>
</tr>
<tr>
<td>Graduate teacher 4, female, early 20s, 1st year out</td>
<td>Susie</td>
</tr>
<tr>
<td>Graduate teacher 5, male, early 30s, 2nd year out</td>
<td>Simon</td>
</tr>
</tbody>
</table>

Louise is a young woman who majored in mathematics and humanities disciplines. Louise chose teaching as a career as a result of her involvement in coaching younger children in sport. Her choice was also influenced by the positive role her own mathematics teacher had played in her own schooling. Louise had been at RiverValley Heights High for eighteen months and was half way through her second year of teaching at the commencement of this study. She had an ongoing position at RiverValley Heights High and was committed to a long teaching career. She taught Maths at Year 8 and Year 12.

Lisa came to teaching after an initial career choice in advertising and after travelling and living overseas for eighteen months. Lisa worked as a teacher’s aide whilst undertaking her
teacher education, where she majored in Media and English. Lisa was in her first year of teaching and initially had a six-month contract at RiverValley Heights that, during the study, was extended to a twelve-month contract. Lisa made it clear from the outset of the study that she intended to stay at RiverValley Heights for only one year, after which she intended to secure a teaching position overseas and continue to travel. Teaching was, however, a career she planned to stay in so that she could make a difference. At RiverValley Heights High, Lisa taught Year 9 Humanities and Year 9 & 10 English.

Kerrie was passionate about teaching science and always intended to become a teacher, entering a teacher education program straight from school. Kerrie completed a professional placement at RiverValley Heights High during her pre-service teacher education and had a one year contract with RiverValley Heights High in 2008, her first teaching position. Kerrie taught Science at Year 10 and Maths at Year 8.

Like Kerrie, Susie was also passionate about science, although teaching was not her initial career choice. Part-time work with secondary school students during her undergraduate degree prompted Susie to shift career directions and undertake a post-graduate diploma of teaching. Susie was also on a one-year contract at RiverValley Heights, her first teaching position after graduation. Susie taught Science at Year 8 and Year 10 and also Year 11 Chemistry. Susie and Kerrie worked closely together particularly in the Year 10 Science area.

Simon became a teacher after experiencing dissatisfaction with his established career as an arborist. Teaching, for Simon, was a pragmatic career choice, seeing it as a means to meet personal lifestyle and income goals, rather than seeing it as a vocational calling as some of the younger graduate teachers felt. Simon was in his second year of teaching at RiverValley Heights High, and during this study taught Year 7 and 8 Materials as well as Year 11 Biology. He had previously taught Year 10 science and Year 7 Maths. Simon was undertaking further qualifications to support his choice to teach in the Materials discipline. Simon had an ongoing position at RiverValley Heights High. Like Kerrie, Simon had also undertaken a professional placement at school during his pre-service teacher education.

**Other staff at the school**

In addition to the graduate teachers, selected members of the school leadership team were asked to be participants in the study. It was important to involve the school leaders who were involved in the ICT agenda of the school in order to understand some of the issues at play in shaping how the graduate teachers made use of ICT in their classrooms. The Principal, the
two Assistant Principals, the ICT Coordinator, the Professional Development Coordinator, the Learning and Teaching coaches as well as the IT Manager all participated in the study. Because this study involved observing how the graduate teachers interacted with other more experienced teachers, as the study unfolded other teachers became more active research participants in the study.

### 3.3.3 Data generation

In qualitative research, data is produced or actively constructed by the researcher, who is not neutrally external to what is being studied and thus has an effect on the data that is generated. I have an effect on the data in the form of the decisions I made regarding the theoretical lens for this study, the design of the study and the beliefs, orientations and values I hold. Data is not simply sitting there waiting to be collected, but produced from my interactions with the socio-material world I am studying (Garnham, 2008). The data production methods used in this study comprised a mix of:

- Semi-structured formal interviews with the graduate teachers and members of the school leadership team (see Appendix I)
- Observations of classroom teaching
- Informal discussions and debriefings with the graduate teachers after each classroom observations (see Appendix II).
- Elicitation devices – a small number of devices were used to elicit responses from the graduate teachers, for example a record of how ICT was used across all classes in a week; (see Appendix III)
- Observations of interactions between graduate teachers and other staff;
- Participation in a variety of staff meetings, planning sessions and professional development activities
- Examination of a range of artefacts including curriculum planning documents, lesson plans, ICT policy documents, textbooks, student diaries, professional development data.

#### Interviews

To examine the individual dimension, semi-structured interviews were held with the six individual graduate teachers focusing on:

- What brought them to teaching
- What their personal philosophies about learning and teaching were
• What role they saw ICT playing within learning and teaching specifically, and within their own learning and teaching generally

• What their own ICT skills were

• How confident they felt about using ICT

• What experience of using ICT or integrating ICT they had experiences during their pre-service teacher preparation program, including both in their course and on practical placements.

Whilst this initial interview provided important data, the interview also served as a mean of establishing rapport with the research participants.

Throughout the fieldwork phase of the study, informal, conversational interviews (Patton, 2002) were held with the graduate teachers on days they were observed. These interviews included descriptive questions aimed at eliciting the participants views on their daily experiences and the people and objects they encountered in their teaching lives as well as questions aimed at eliciting the participants’ reasons behind their pedagogical and ICT choices.

Interviews always took place at the school. Formal interviews were conducted in spaces that were available and as private as possible, for example in the empty staff room, small meetings rooms, empty classrooms, quiet study spaces in the library. Interviews with school leaders were conducted in their offices. Informal interviews with teachers were held wherever we happened to be. Sometimes this involved talking whilst walking between classes, or at the beginning and end of classes as the participant was setting up or packing up, or in an empty classroom. At other times the informal interviews with participants reflecting on their pedagogies took place in the smaller staffrooms that were shared with other teachers. At times this may have constrained some of the conversations, although issues that were not fully explored in these settings were raised in subsequent, more private conversations. Informal conversations with participants frequently occurred in the various staff rooms they shared, sitting around the staff room table at recess or lunchtime.

**Participant Observation**

This study was interested in seeing what the ICT-based pedagogies of the graduate teachers were as well as what shaped them. Whilst self-reported pedagogical practices were provided as part of the initial interview, the literature suggests that espoused practices are frequently at odds with enacted practices (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur,
therefore it was important that the ICT-based pedagogical practices of the graduate teachers were observed. Rather than just relying on self-reported practices I want to see the actual practices as performed in the classroom.

It was also important for the aims of the study to examine how the graduate teachers interacted with other elements of the school – other, more experienced teachers. This meant observing staff room interactions, participating in staff meetings, curriculum planning meetings and professional development sessions. Observation in these activities assisted in developing a better understanding of the culture of the school, which was also supported by interviews and conversations with other teachers at the school and with members of the school leadership team.

I had planned to shadow each of the five teachers at least 3-4 times each term. However, in practice this didn’t eventuate for all five teachers. For a variety of reasons – illness on the part of the participants, participation on school camps and excursion, supervising sports activities or professional development activities – some planned days of shadowing were cancelled. No classes were observed in Term 1, for ethical considerations (see section 3.5) and because Term 1 was a particularly shortened term due to scheduling of school holidays. Instead, all initial interviews with the graduate teachers and school leaders were conducted during this period. Table 2 below sets out the number of classes actually observed for each participant.

Table 2: Number of observations per participant

<table>
<thead>
<tr>
<th>Research participant</th>
<th>Number of classes observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louise</td>
<td>24</td>
</tr>
<tr>
<td>Lisa</td>
<td>27</td>
</tr>
<tr>
<td>Kerrie</td>
<td>24</td>
</tr>
<tr>
<td>Susie</td>
<td>27</td>
</tr>
<tr>
<td>Simon</td>
<td>21</td>
</tr>
</tbody>
</table>

A range of artefacts were collected during the fieldwork phase of the study. Textbooks, curriculum planning documents, ICT strategic policies, school policies were collected and
examined for how they positioned the use of ICT in learning and teaching.

### 3.3.4 Data reduction and analysis

We are sunk in a flood of data, reports, transcripts, tables, statistics and articles. How does one make sense of this mess as it piles up on our desks and fills countless disks with data?? You rummage about in this dark sludge of data to bring light to the world. And when you begin to write in earnest, finally pleased with yourself, you have to sacrifice vast amounts of data that cannot fit into the small number of pages allocated to you. How frustrating this whole business of studying is. (Latour, 2005, p. 123)

Traditional analysis of qualitative data suggests that field notes, interviews and researcher reflections are transcribed then usually coded according to themes and categories. Themes can be pre-set or *a priori* themes that are identified in the review of the literature or from the research questions themselves. Other themes may emerge from the analysis of the data itself as grounded theory suggests – emergent themes that might represent finer nuances or different emphases in the data from what might have originally been planned (Bazeley, 2009). The use of themes is an attempt to make some order out of the data collected, to provide clarity, to make things tidy (Law, 2003).

My intention was to use a traditional approach to analysing the transcribed data from interviews, classroom and staff room observations and fieldnotes and that process was commenced. Initial coding categories were drawn from my reading of the literature and the research questions and linked to ideas about beliefs and self-efficacy, the graduate teachers’ prior experiences with technology, the role of the more experienced teachers and the policies within the school, the level of access that the graduate teachers had to ICT, the role that artefacts such as curriculum documents, text books and the like might have played.

However, new categories emerged as more time was spent within the research.

An issue for the development of coding became the level of granularity, particularly when trying to untangle the mess of the material world of RiverValley Heights High School. The complexity of what was at play created a coding framework that become unwieldy as new codes emerged for all the things that were interacting to shape the practices of the graduate teachers. The complexity in the data reflects John Law’s (2003) view that reality is at times messy and incoherent, and that the incoherencies should be allowed to manifest themselves (p. 11).

A limitation of coding frameworks and of identifying coding categories is that the data is then
reduced to fit in with the codes. In a sense the codes become self-fulfilling and at the same time reductionist. The codes that are used have a tendency to govern the analysis and the subsequent writing up of a study, that is, the way that the reality under study is represented. Postmodern methodologists argue that this approach is problematic (Gough, 2008; Richardson & St. Pierre, 2005), since it has a tendency to ignore that data that does not fit neatly into the identified themes and categories.

Analysis of qualitative data is an iterative approach of re-examining key incidents and themes (Stake, 2010). At the same time as coding data, I was re-reading the data and I was writing notes and interpretations of the field data, an initial attempt to make sense of what I had learned (Denzin & Lincoln, 2003). In the process of re-reading the data, writing, and re-arranging ideas, data was being analysed in an iterative process. I identified patches of data through the stories and vignettes around key incidents and observations (Stake, 2010) that supported the strongest issues for understanding how the ICT-based pedagogical practices of the graduate teachers under study were being shaped. At the same time, other patterns started to become apparent as I re-read the data in different directions, trying to find patterns or consistencies across the data, or patterns of inconsistency (Stake, 2010). This was a process of describing, comparing similarities and differences across all six key participants as well as relating these ideas to other themes and categories, identifying divergent views or cases.

3.4 Rigour

Concepts of validity, reliability, objectivity and generalisability are concepts derived from the sciences and positivist paradigms. This study does not situate itself in such a space. Rather, notions of credibility, dependability and trustworthiness of data have greater relevance (Lincoln and Guba, 1985) to this study.

To ensure the credibility and dependability of my data, I followed Lincoln and Guba’s (1985) suggested procedures to ensure standards of trustworthiness were met:

- Prolonged engagement - I was immersed in the research setting for a prolonged period of time, spending days with each of the six graduate teachers, observing their teaching, talking with them and observing their interactions with other teachers at RiverValley Heights High.
- Member checks - I spent time during my conversations with research participants checking that my interpretations of events and beliefs were consistent with their own
- Triangulation - I gathered data in multiple ways and from multiple sources, through
interviews with the graduate teachers and other teachers as well as selected members of the school leadership team who were in positions to influence the ICT agenda within the school; through observation of classroom practice and staffroom interactions, professional development, curriculum planning and strategic committee meetings; I examined a range of artefacts that may have had an influence on the way the graduate teachers used ICT, including textbooks, curriculum planning documents, and strategy documents.

- peer debriefing – I used professional friendships to discuss what I was seeing and what I thought it meant.

3.5 Ethical considerations
The primary focus of this research was on the graduate teachers participating in the study. Plain language statements outlining the aims and significance of the study were provided to the graduate teacher participants together with informed consent forms (See Appendix IV). Plain language statements and informed consent forms were also provided to other staff members as they were identified as being important to the study. Where a staff member elected not to give their consent to participate in the research, data that was generated from their interactions with the graduate teachers was omitted.

All research participants were given the opportunity to renegotiate their involvement or withdraw from the study if participation became onerous for them, hence the importance of selecting a school with a large intake of graduate teachers.

Being a participant in this research study had the potential to add to the stress and to the workload burden of the graduate teachers, particularly in their very first term of teaching. As such, no classroom observations were conducted in first term. This was considered an important time for the new teachers to establish a rapport with their students and to establish important classroom routines.

In keeping with general ethnographic practices, pseudonyms have been used to protect the identities of the research participants. Research of the type intended for this study necessarily pried into the lives of the research participants. It has the potential to reveal sensitive information about the participants, that “can be used to affirm their rights, interests and sensitivities, or to violate them” (Spradley, 1980, p. 21). Care was also exercised in formal and informal discussions with the Principal or other staff to protect the identities of all research participants. Any discussions about the research were couched in ways that the
identities of individuals were not revealed so that reputations were not inadvertently damaged or enhanced.

Copies of transcripts were offered to the all research participants for their perusal and amendments however none of the participants actually accepted the offer of reviewing the transcripts.

Any research project becomes exploitative when the participants in that research gain nothing or actually suffer harm from the research (Spradley, 1980; LeCompte and Schensul, 1999a). There needs to be careful consideration of what might constitute a ‘fair return’ to the participants for their involvement in this study. This study provided the graduate teachers with opportunities to reflect on their own emerging practices, both individually and in conjunction with their peers. These opportunities may have enhanced the experiences of the individual research participants and may have provided an enhanced level of support in the early days of their careers.

One of the challenges when conducting ethnographic fieldwork it is that the presence and insights of the investigator may have an undue influence on the actions of those being investigated and therefore introduce a bias into the study. I have considerable expertise in integrating ICT across the curriculum and was in a position to provide professional development activities and advice to the participants in this study about how they might improve their practices and to the school about some of the issues they were facing in facilitating the integration of ICT. However, such intervention raises the issue of what is being studied – my interventions, or the development of ICT practices of the participants. I felt it important to resist the temptation to offer my advice during the fieldwork phase of the study. However, I felt that this research would be exploitative unless I offered my time and expertise as a form of quid pro quo. To minimise the impact that this would have on the integrity of the study I offered my expertise following the fieldwork phase of the study. Such insights were intended to inform the school’s plans around ICT implementation across the school, curriculum planning processes, teacher professional development and graduate teacher mentoring programs. However, largely as a result of significant changes to the leadership team at the school, my offer was not taken up.

3.6 Limitations and contingencies

It must be recognised that, while the school that provided the setting for this study might be considered ‘typical’, what occurred within this school was just that. It is what happened in
this particular school, with these teachers, students, technologies, policies, spaces, buildings and so on and in this particular historical, social, political and economic time. Further, this is a small-scale study aimed at deepening understandings of a specific context. It is bounded and situated in a specific context (Marshall & Rossman, 2011). The findings from this study are therefore not generalisable to all schools or to all graduate teachers. However, findings from the study might be transferable to other settings, such as similar schools or contexts when considering the implementation of ICT policies and initiatives at the school level.

Schools are frequently busy places, with competing demands being placed on teachers’ time. At times during the fieldwork, various individual research participants would have to cancel my observation sessions as a result of their participation in unplanned professional development activities, or school camps and excursions or sporting events. As a result, the number of classroom observations that were actually undertaken was less than initially planned.

Understandings generated from ethnography are always partial (Bishop, 2005), bound by what can be achieved within the scope of the study and influenced by the subjectivity of the researcher. It was never possible, nor practical, in this study to observe all classes taught by all the research participants. To gain further insight into the ICT-based pedagogical practices of the participants I had initially planned to examine the lesson and unit plans used by the graduate teachers for classes I was unable to observe, examining these to determine the nature and extent of integration of ICT as well as the pedagogies adopted. I had assumed that such curriculum documentation was a normal practice. That was not a realistic assumption since none of the participants wrote clearly articulated lesson or unit plans. To overcome this limitation I asked the participants to keep a log of their use of ICT in their lessons for a period of a week (see Appendix III). I had planned to ask for this data once each term, however, not all the participants managed to complete their logs the first time, nor were they pre-disposed to filling them out for a second or even third time. My final solution was to revert to informal discussion and notes about their use of ICT in non-observed classes.

It was also not possible to observe all interactions between the graduate teachers and other more experienced teachers within RiverValley Heights High School. Nor was it possible to attend every staff meeting, or ICT committee meeting or professional development session or curriculum planning meetings. If the participants I chose to observe and talk with, or the events I chose to observe did not represent the culture of RiverValley Heights well, then the subsequent analysis of this data would be diminished. To overcome this limitation I
endeavoured to identify those other teachers in RiverValley Heights in positions of influence over the way things were done in the school, as well as those who had a strong influence with the graduate teachers.

Another limitation of qualitative research lies with the researcher herself. In any qualitative research study, the researcher is not neutral or objective. Their view of the research site and research participants is filtered through lenses of class, gender, race and culture (Denzin & Lincoln, 2003). Researchers bring with them patterns of behaviour and beliefs, ways of looking at the world that are shaped by cultural heritage and educational levels. These lenses shape how a qualitative researcher sees the world and combined with the experiences they bring, their characteristics and subjectivities, influence their research (Le Compte and Schensul, 1999). Care must be taken to be reflexive, to check for personal bias and interpretation.

I bring with me my own set of beliefs, ideas and theories about how things are, and it is through these lenses that I can’t help but filter what I experience and how I experience it. I am a female teacher educator, previously engaged in policy development at the State level related to integrating ICT into schools. My background in public policy, ICT and teacher education, in one way or another, shapes how I see the integration of ICT in schools. A major battle for the qualitative researcher is to be aware of her own biases and to account for them, in relation to the things she chooses to pay attention to and the things she chooses to ignore; in relation to the phrasing of questions in the interview process; and in relation to the choices of stories to tell in assembling accounts.
Chapter 4 – Practising within a socio-material organisation

4.0 Introduction
In Chapter 2 I argued that practice is complex and results from the interplay between the personal, the organisational and the broader societal context in which the practice is enacted. I argued that practices are highly situated, and are commonly developed within a community, where the approaches taken by the more experienced members of a community significantly shape how newcomers to that community enact their own practices. I identified arguments in the literature that suggest an individual’s practices, in this case teaching practices, are also shaped by internal factors such as their own beliefs and their own educational experiences. I also argued that other factors that take a more socio-material form could also shape how practices are developed. In this and the following two chapters, I present the findings and analyses section of this thesis.

In this Chapter, I begin with a description of RiverValley Heights High School to provide a macro-level analysis of the context in which the graduate teachers were situated. I describe the organisational and material features of the school, the context in which the community of practice of teachers, both experienced and new, enacted their ICT-based pedagogical practices. In Chapter 5 I then present findings and analyses about the approaches to teaching and integrating ICT taken by the more experienced teachers at the school, the old timers within the community of practice of teachers at RiverValley Heights. The findings are drawn from analysing the perceptions about how the more experienced teachers at the school integrate ICT from three different stakeholder groups - those in leadership positions, some of the more experienced teachers themselves, as well as views from the students.

In Chapter 6 I turn to examine more closely the ICT-based pedagogical practices of the graduate teachers themselves and the factors that helped to shape those practices - their beliefs about learning and teaching and about the role that ICT might play in that; about their own skills and confidence in using ICT.
4.1 RiverValley Heights High

4.1.1 Background

RiverValley Heights High is a co-educational Government secondary school of approximately 1450 students in Years 7 to 12 located in an established outer suburb of Melbourne, Australia. The median family income in the catchment area for RiverValley Heights at the time of this study was above the national average; unemployment in this area was well below the national rate; over half the families in this area were couples with children; the rate of home ownership was well above the national average; the vast majority (90%) of the population were Australian-born, with English being the only language spoken at home by 76% of the population.

The demographics of the surrounding suburb positions RiverValley Heights in ‘Like’ school category 2. Schools in ‘Like’ school Group 2 have low proportions of students from non-English speaking backgrounds and low proportion of students receiving the EMA or Youth Allowance and are perceived as being better than average schools academically.

In the ten years prior to the study, RiverValley Heights’ student population had grown from 1100 to 1450. The majority of students was drawn from the surrounding suburbs and was born in Australia to parents who were born in Australia. The exceptions were 50 fee-paying international students who attended the school.

RiverValley Heights employed 105 EFT teaching staff and 35 non-teaching staff in 2008. According to the Principal, the highest proportion of teachers was experienced or ‘expert teacher’ with thirteen or more years’ experience. The next highest proportion of teachers was ‘graduate teacher’ with less than four years teaching experienced. Between 10-15% of the current teachers were eligible for retirement in the two years subsequent to this study, a significant proportion of the staff.

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1 Victorian schools have been divided into nine groups, referred to as Like Schools, based on the demographic background of their students, to enable schools to allow for the composition of their student populations when assessing their performance. The groups are identified by the proportion of students for whom the main language spoken at home is not English, and the proportion of students who receive the Education Maintenance Allowance (EMA) or Commonwealth Youth Allowance.
4.1.2 Physical characteristics of the school

Geography

RiverValley Heights is situated on a large sloping site, with open areas interspersed between classroom and administration buildings. To move between buildings usually requires the negotiation of multiple sets of steps.

The dispersed layout of the school meant it took longer than normal to move between staffrooms and teaching spaces, and between different teaching spaces. The library, the repository of much of the portable ICT equipment including data projectors and keys to computer labs, is located in the centre of the school campus. The need for staff to visit the library to obtain data projectors or the key to the computer lab often meant a five minute return walk from each of the staff rooms and back to their classrooms, reducing preparation time, as illustrated by this comment from one of the graduate teachers:

It drives me nuts – I lose so much time running around between classrooms, the library and the labs. [INT-Lisa-020608]

It was policy at RiverValley Heights that students always assemble at their timetabled classroom before moving to a computer lab or alternative teaching space. As a result, teachers have to factor in a loss of actual teaching time when using computer labs.

Some staff members at the school believed that the site discouraged teachers from taking ICT equipment, including their own laptops, with them to class, as one of the Assistant Principals explained:

They would have to carry them from one classroom to another and they were very heavy and this site was not conducive to that. [INT-AP1-190308]

The difficulties associated with the physical nature of the school site also posed dilemmas for the school when planning the acquisition of new, portable ICT computers. The physical constraints of the site mean that moving trolleys of laptops or netbook computers around the school site was not feasible, as illustrated in this comment from one of the school leaders:

It’s all very well talking about trolleys of laptops and class sets of netbooks but who’s going to push a trolley of laptops down past G Block? How do you get trolleys down all the steps? It’s hard enough already carrying your books and laptop without having to push a great big trolley around. [FN-ISH-160608]
Classroom spaces

The school has a range of permanent classrooms and administration facilities. However, since the day it opened, RiverValley Heights relied heavily on the use of relocatable classrooms, commonly referred to as portables, to accommodate all its classes. Approximately half of all classrooms are in portables, including some science classrooms as well as a computer laboratory and one of the four staffrooms. Most of the portables are small, with very limited space for anything other than students sitting at rows of tables. The majority of the portable classrooms had a single power outlet, which was generally used by teachers to plug in their laptops, leaving no outlet for powering data projectors or other devices, unless teachers brought a power board as well. The following two extracts from fieldnotes describe two classrooms that were typical of the spaces used by the graduate teachers:

Lisa assembles her Year 9 English class in their usual timetabled classroom. It is a small portable classroom, with barely enough space for the desks and chairs for the 25 students and the teacher. The front of the classroom is taken up with two whiteboards, of the non-interactive kind. The back wall has some display space – with nothing on display. The side walls are made up of banks of windows, looking out onto rows of similar portable classrooms on either side. Desks are plain rectangular tables that seat two students comfortably. Chairs are the common plastic outdoor chairs you buy cheaply at hardware stores. There is a single power point on the side wall under the windows. There is no space, and no way to create a space, to do anything but have the students sit at the tables. [FN-Lisa-170308]

Kerrie tells me she is teaching in her least favourite room, a portable Science classroom she referred to as The Bog of Eternal Stench. Kerrie described it as “one of the dodgy old science labs. There is no technology in it at all” [INT-Kerrie-280408]. This room was located at the far corner of the campus, at least a five-minute brisk walk from her staff room, down three flights of steps and whilst large, it was very dirty and had a fetid smell. There are benches and sinks around the edges of the classroom, with rows of tables and chairs in the centre of the room. The only power outlets are located at the front of the room on the teacher’s bench. There is a plain whiteboard at the front of the class. Kerrie had to bring in a portable data projector and her own power board to plug in her laptop, the data projector and speakers [FN-Kerrie-280408].

The graduate teachers were commonly timetabled into the portable classrooms. Louise’s, Susie’s and Kerrie’s Maths classes were all held in portable classrooms as were most of
Lisa’s classes, with the exception of her Year 10 English class. All of Kerrie’s classes were timetabled in portable classrooms:

I only teach in the portables so I don’t have the luxury of built-in data projectors. I am so over it. [INT-Kerrie-080908]

When asked if she had had an opportunity to implement some of the ideas she gained at a professional learning session on ICT, Kerrie responded with some degree of cynicism:

Are you kidding? Look at where I teach! Not a chance. [INT-Kerrie-080908]

Poor security of the portable classrooms - “we’ve had stuff disappear the first week” [INT-ISH-230408] - meant that computers were not placed into these spaces. Portable classrooms also posed problems for network access. The wireless network did not work as effectively in the portable classrooms because of the increased quantity of steel in their construction. Cabling the portables was not seen as an option due to costs, as explained by one of the Assistant Principals:

Fifty percent of our classrooms are portables and they have poor security and they’re not necessarily here for the long haul and we need cabling for all those long distances that those portables come with, it’s just prohibitively expensive. [INT-AP1-190308]

In summary, the nature of the school site has implications for how the teachers at RiverValley Heights High made use of technology. The site’s steepness made transporting portable ICT equipment difficult to access. The dispersed layout of the school took time to move around. Over half the teaching spaces were not ICT-friendly, being small, lacking in power outlets and network connectivity and not considered secure enough to warrant permanently fixed ICT equipment.

4.1.3 ICT Facilities

At the time of the fieldwork for this study RiverValley Heights had a total of approximately 246 desktop PCs giving the school a computer to student ratio of 1:12.8 compared to the Victorian Government’s performance target at the time of 1:5. Many of the computers available for student use were more than three years old.

All teachers in RiverValley Heights, including the graduate teachers, were issued with a teacher laptop computer under the Victorian Government’s Notebook for teachers program. Under this program the Education Department leases laptop computers on behalf of teachers. Teachers make a co-contribution to the lease costs. The school provided technical support for
the laptops.

RiverValley Heights had a wireless network in place that enabled teachers to use their laptops across the school campus, although this was sometimes problematic in the portable classrooms (see 4.1.2). Two full time staff members, including the IT manager and a full time IT technician, provided technical support for the network and IT equipment. Additional technical support was provided on a contract basis from time to time.

Computers were located in four computer labs, the Library, three computer ‘pods’ and in spaces used exclusively for the International students. However, two of the labs were frequently timetabled for teaching, particularly for IT and Media classes, making them largely unavailable for other subject areas. Only two labs were not timetabled at all. There were computers available for student use in the Library, however the school had reduced the number of computers to discourage teachers from booking the Library as an alternative to a computer lab. The preference was to restrict the use of the Library computers to student research activities.

Computer pods, of between 10-13 computers, were located in corridor spaces between the science labs and near the media classrooms. The pods were not able to be booked and were used exclusively by classes who were timetabled in the adjacent classrooms, i.e. Science or Media.

The school had four Interactive Whiteboards, although only one was located in a non-timetabled space. Portable data projectors were available for staff to borrow from the Library, with some permanently installed in the Science block and computer labs.

Staff perceived there to be a lack of ICT facilities. One of the younger teachers who had been at RiverValley Heights for over two years was discussing the possibilities of using digital storytelling in her classroom following a professional learning session that she had just attended. Lack of access to computer facilities was raised as an issue. She said, “I try to use technology but…..” and trailed off. Overhearing the interview, one of the Learning and Teaching Coaches suggested she could use the Macs in the Media area. The younger teacher responded, “They’re always booked by the media people” [INT-ET4-020608]. Another of the more experienced teachers, when talking about ICT at RiverValley Heights echoed the view that there was a scarcity of ICT:

The coaches are supposed to train us in how we can use ICT to communicate and so on and eventually get the kids doing similar things, but we have three computer
rooms! (She said with an air of exasperation.) Two years ago the staff were surveyed about what would make staff lives easier. ICT resources were at the top of the list. Haven’t seen it [INT- ET3- 020608]

These two teachers felt their use of ICT was constrained by limited access to the computer facilities at the school. One of the graduate teacher participants added her voice to the complaints about the difficulty of accessing the computer labs. For example:

So I tried to have half time in the classroom maybe doing something and then half on computers, and I’d book - and it’s so hard to get computer rooms, like it is difficult to get computer rooms all the time. [INT-Susie-300408]

Scarcity of portable ICT equipment such as data projectors was also a problem, as another graduate teacher pointed out:

I have to book them first thing in the morning, but I can’t always get one. They’re in high demand. [INT-Kerrie-280408]

As part of her professional learning team project, one of the graduate teachers had created an interactive resource designed to be used on an IWB, however, wasn’t sure if she could use it in her class:

I can use it if I can swap with someone who is timetabled in a classroom with the IWB. I don’t have any classes timetabled in a room equipped with an IWB. [INT-Susie-091008]

One of the implications was that to guarantee access, teachers had to book well ahead of their planned use, or risk not being able to access a computer lab when they wanted to use it. Commenting on how far ahead bookings needed to be made, one of the graduate teachers commented:

It depends, sometimes you can be lucky and get some that day, sometime you book them a week ahead. [INT-Susie-210508]

Some of the teachers felt that it was not always possible to plan as far ahead as was necessary, since, as Lisa put it:

I don’t always know that far ahead when I’m going to want to use a lab. I mean I might have a plan, but then stuff happens that means the plan goes out the window. [INT-Lisa-020608]

Difficulties in accessing ICT spaces and equipment made integrating ICT difficult for many
and, in some cases, acted as a disincentive to integrating ICT, as explained in this observation from one of the senior teachers:

Because they’ve got to cart their laptop and, in most cases, a cart, a data projector and book it in advance and set it all up when they get there and pack it all up when they leave, I think it all becomes too hard. It’s easier to just walk in and do your normal thing, I think. [INT-ISH-230408]

A key exception to this rather gloomy picture was the newly established Year 7 space. A key focus for the Learning and Teaching Coaches (see 4.2.2) during this study was to oversee the conversion of two classrooms into a large, open teaching and learning space, equipped with two interactive whiteboards and a trolley of 25 laptop computers. Two Year 7 classes spent most of their time in this space, with teachers in this space exploring team teaching and more integrated learning approaches. This initiative was seen as a potential model for the planned development of a new Year 9 space in the school, again focused around more integration of ICT and integration between learning areas.

The data in this section suggests that, with some significant exceptions, there were insufficient computing resources available to most of the teachers at RiverValley Heights at the time of this study, including the graduate teachers in this study, to integrate ICT to the extent that they wished. Gaining access to ICT resources meant planning well ahead, which was not always compatible with the reality of teaching. However, the data also suggests that RiverValley Heights was attempting to develop more ICT-enriched teaching spaces across the school campus.

4.2 ICT Leadership

This section reports on changes to leadership in relation to the ICT agenda and how these changes and the stances taken by those in leadership positions may have influenced the extent and nature of ICT integration into learning and teaching across the school.

4.2.1 Leadership changes

During the course of this study, the leadership roles at RiverValley Heights underwent significant change. At the end of Term 1, the incumbent Principal left the school and was replaced pro tem by the two Assistant Principals who assumed a shared Principal role whilst the School Council commenced the search for a permanent replacement. In a ripple effect, other teachers in leadership roles stepped up to fill the ensuing vacancies at Assistant
Principal levels and so on.

Some of the senior teachers, who had been ‘champions’ of more innovative approaches to learning and teaching or to ICT, or to both, had departed the school in the two years prior to this study. The Principal admitted that his detailed knowledge in the area of integrating ICT and pedagogy was limited, and that he had relied heavily on one of his previous Assistant Principals and one or two leading teachers to carry this agenda. The departure of these staff members had left a significant gap that the Principal felt was not being filled. This view may have contributed to the Principal’s decision to declare key leadership positions vacant, meaning that those currently occupying leadership positions were required to compete for reappointment with other staff.

In the midst of this unstable environment, leadership of the ICT agenda, among others in the school, was still required. At the same time, the school was undergoing its triennial school review process, which meant additional workload for all those in leadership positions. This section examines how the school responded to leading the ICT agenda. Because this study has a focus on pedagogical practices involving the integration of ICT it is particularly interested in how pedagogy around the use of ICT was positioned by the school’s leadership team.

4.2.2 Learning and Teaching Coaches

The departure of ICT champions had left a significant gap in relation to the pedagogical implications of integrating ICT. As two of the school leadership team put it:

Those teachers left the school and there hasn’t really been a willingness of the other teachers to pick up on some of that [ICT]. [INT-APRIN1-190308]

There’s no one I’d identify as having that sort of role or group of people. [INT-L&T1-160408]

In recognition of the need to re-ignite the push to ICT integration, and in an attempt to plug this gap, RiverValley Heights’ Principal worked with a network of local secondary schools to secure funding for a team of Learning and Teaching Coaches to work with Year 7-10 teachers across the network on the integration of ICT. The role of the coaches was to shift pedagogical practices to accommodate more authentic and meaningful uses of ICT in the classroom. The coaches were also responsible for working with teachers to integrate learning across Mathematics, English, Science and the Humanities (MESH) in Years 7& 8. The coaches saw themselves with a dual responsibility to:
Work in a variety of areas - at grass roots working with teachers and their practice, at management or leadership level working on the big picture with ICT, such as change in pedagogy, developing team teaching and developing, most importantly, eLearning rich environments. [INT-L&T1-160408]

However, the Learning and Teaching Coaches believed that they had struggled to connect with the other teachers at RiverValley Heights. One of the coaches commented:

   At the other schools we are really welcomed and we have lots of teachers who want to work with us and have us help them. But here is so different. I have to approach teachers individually and almost beg to get them to try something new. [INT-L&T2-180808]

There was also resentment from some staff to the presence of the coaches, as though the coaches were there to fix the deficiencies the existing teachers had with ICT and with their approaches to teaching and learning. Others saw the Learning and Teaching Coaches as having too much influence over the curriculum, and were resentful of the time the integrated learning initiative took from planned learning area meetings, for example the head of one learning area at the school felt:

   Limited in how many [learning area] meetings I’ve been able to have because of the MESH meetings. In fact I called a department meeting tonight that clashes with MESH. MESH doesn’t run my Maths department! [INT-ET6-301008]

Other teachers confirmed this view, for example Louise said:

   I don’t think the coaches have been well received. [INT-Louise-050908]

There seemed to be a sense that the learning and teaching coaches had been imposed upon staff, exemplified by this comment about the integrated learning project:

   You need to ensure that the teachers own the project. Because if it were me I wouldn’t want to do something someone else told me to. A lot of the MESH project involved teachers who weren’t really on board and it hasn’t worked. [INT-Louise-050908]

There seemed to be lack of clarity around responsibilities with the arrival of the Coaches. Two of the leadership team felt unsure about their role and how it linked in with the role of the Coaches, as exemplified in these comments:

   I’m a bit at odds this year because the learning and teaching team have come in and
eLearning is their main focus in lot of ways, which has picked up some of the stuff I probably should be doing. [INT-ISH-230408]

I’m not too sure if I’m supposed to do that or the coaches are covering that. [INT-PLC-140508]

Attempts by the school to fill the gap by the departure of those who had previously championed ICT and learning and teaching were well intentioned but in reality not well received by the staff at RiverValley Heights. Confusion and a degree of resentment were the most common responses to the arrival of the learning and teaching coaches.

4.2.3 IT Committee and ICT vision

The ICT agenda at RiverValley Heights was overseen by the IT Committee, which comprised one of the Assistant Principals, the Head of Information Services, the IT Network Manager, the Head of the Technology Learning area, the Learning and Teaching Coaches Team leader, and the Professional Development Coordinator.

Analysis of notes collected from six separate IT Committee meetings attended throughout that year (Table 3) that meetings were characterised by debates over what equipment should be acquired with the funding that was about to flow for new computers under the Commonwealth Government’s Digital Education Revolution (DER) initiative and where that equipment would be located around the school. Discussions about protocols and procedures associated with borrowing and managing access to the new computers, which were to be mostly portable devices, also dominated the discussions. Meetings early in the year also focused on the mechanics of managing the rollover of staff laptops to a new model. A key project for the committee was the installation of large LCD screens around the campus as a communication tool for students and staff. Booking systems and access to portable ICT equipment (including keys), new equipment purchases, management of IT support, and budgets were also discussed. All of these were real and often pressing issues that the Committee needed to manage.

However, analysis of the items discussed show that very little time was spent discussing the pedagogical implications of the Committee’s decisions or articulating the school’s eLearning vision. There was a dominance of technical issues over learning and teaching issues associated with integrating ICT.
<table>
<thead>
<tr>
<th>IT meeting 170408</th>
<th>IT meeting 120508</th>
<th>IT meeting 160608</th>
<th>IT meeting 180809</th>
<th>IT meeting 180908</th>
<th>IT meeting 201008</th>
</tr>
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<tbody>
<tr>
<td><strong>Staff laptop rollover</strong></td>
<td><strong>Staff laptop rollover</strong></td>
<td><strong>Staff laptop rollover</strong></td>
<td><strong>LCD screens around campus</strong></td>
<td><strong>Library storage of equipment</strong></td>
<td><strong>LCD screens around campus</strong></td>
</tr>
<tr>
<td><strong>IT support management system</strong></td>
<td><strong>IT support management system</strong></td>
<td><strong>IT support management system</strong></td>
<td><strong>security issues</strong></td>
<td><strong>Booking new equipment</strong></td>
<td><strong>IT support management system</strong></td>
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<tr>
<td><strong>LCD screens around campus</strong></td>
<td><strong>LCD screens around campus</strong></td>
<td><strong>LCD screens around campus</strong></td>
<td><strong>Library storage of equipment</strong></td>
<td><strong>Mobility around campus (trolleys)</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
<tr>
<td><strong>DER – requests to staff for bids for new equipment</strong></td>
<td><strong>DER – progress report on staff bids for new equipment – netbooks, laptops</strong></td>
<td><strong>DER – replacement of desktops, staff preference for netbooks, some laptops</strong></td>
<td><strong>keys</strong></td>
<td><strong>DER survey outcomes – to be presented at staff meeting (not here)</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
<tr>
<td><strong>no more computers in labs or in Library</strong></td>
<td><strong>no more computers in labs or in Library</strong></td>
<td><strong>no more computers in labs or in Library</strong></td>
<td><strong>DER -mobility around campus (trolleys)</strong></td>
<td><strong>DER funding decisions</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
<tr>
<td><strong>Laptops &amp; trolleys</strong></td>
<td><strong>Laptops &amp; trolleys</strong></td>
<td><strong>Laptops &amp; trolleys</strong></td>
<td><strong>Digital Roadmap needed for DER funding (infrastructure only)</strong></td>
<td><strong>Microphones</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
<tr>
<td><strong>ePotential survey plans</strong></td>
<td><strong>ePotential survey plans</strong></td>
<td><strong>ePotential survey plans</strong></td>
<td><strong>IWBs</strong></td>
<td><strong>System to monitor student damage of equipment budget</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
<tr>
<td><strong>eLearning plan needed budget</strong></td>
<td><strong>eLearning plan needed budget</strong></td>
<td><strong>eLearning plan needed budget</strong></td>
<td><strong>Microphones</strong></td>
<td><strong>DER -location of laptops</strong></td>
<td><strong>Library storage of equipment</strong></td>
</tr>
</tbody>
</table>

Table 3: Items discussed at IT Committee meeting
In one illustrative example, the head of the learning and teaching coaches sought IT Committee approval to purchase a set of microphones, at a cost of approximately $150, so that staff could implement ideas from recent professional learning about digital storytelling. Some of the cables connecting the microphones in the screens to the computers had been ‘stolen’ by students and the IT technicians had removed the rest because the IT Manager “didn’t know anyone wanted to use them to record anything” [FN-ITC-120508]. Creating digital stories was therefore not possible in the computer labs. The Coaches wanted to capitalize on the enthusiasm shown at the professional development session, however the Committee chose not to support the request, but to wait for the new computers that would come with in-built microphones [FN-ITC-120508]. The new computers had still not arrived at the end of the school year some six months later. The head of the learning and teaching coaches was upset by the decision, remarking “now you see what I am up against. Every time I try to talk about learning I get this” [INT-L&T1-120508]. At a later meeting, the Committee was discussing staff requests for computers under the DER initiative. The head of the learning and teaching coaches expressed her concern that the requests for class sets of laptops suggested “an alignment with a philosophy of a portable computer lab, rather than seeing laptops as a collaborative learning tool.” [FN-ITC-180908] However, her comment, which was about the pedagogy of integrating ICT, was ignored.

To comply with the DER funding guidelines the school had to provide a copy of its eLearning strategy. The Victorian Education Department at the time strongly recommended that school leaders develop an eLearning Vision and Plan “to support you to improve eLearning in your school, and to begin integrating ICT and eLearning across all aspects of school activity to improve learning and teaching and student outcomes.” (Department of Education and Early Childhood Development, 2010)

A key element of such a plan should have been a focus on “how schools lead, enable and support the use of ICT to transform learning and teaching, extending learning opportunities and improving learning outcomes” (Department of Education and Early Childhood Development, 2010).

However, RiverValley Heights High School did not have an eLearning plan that set out a clearly agreed vision for ICT across the school and associated priorities that would drive decision making around ICT resources and programs. The Learning and Teaching Coaches saw the lack of a cohesive vision for ICT in an eLearning plan “as a real weakness” [INT-L&T1-160608] in that there was no agreed vision for how learning and teaching might be transformed.
In the absence of such a document at RiverValley Heights, the Committee delegated two members to prepare a Digital Roadmap. The Digital Roadmap was to “detail a broad infrastructure, support and costing roadmap required, by year, to support the eLearning goals, strategies and curriculum specified in the school eLearning plan” (Department of Education Employment and Workplace Relations, 2010)

Sections of the document that required information and plans about equipment and budgets was detailed, however there were gaps in sections that sought clarification about eLearning focus and teaching and learning outcomes. Discussions at IT Committee meetings on the two occasions the document was an agenda item focused heavily on the technical and equipment issues, but not on the learning and teaching implications.

In summary, much of the concern of the IT Committee focused on issues of managing a large IT network and juggling budget priorities rather than providing leadership in creating a vision for ICT across the school.

4.3 Professional learning

The literature reviewed in Chapter 2 suggests that teachers lack skills and knowledge about how to use ICT in transformative ways. Professional learning therefore can play an important role within a school as one strategy for improving the extent and nature of ICT integration into learning and teaching. With this in mind, this section presents a picture of professional learning at RiverValley Heights and how ICT was positioned within that landscape.

All staff members at RiverValley Heights, like at all Victorian schools, were required to attend a minimum number of professional learning sessions each year to comply with registration requirements with the Victorian Institute of Teaching. RiverValley Heights offered weekly professional learning sessions for all staff in terms 1, 2 and 4, delivered by external providers or internal staff members. Some of these were deemed to be compulsory but the majority was optional. In discussion with the Professional Learning Coordinator it was revealed that staff took very different approaches to their professional learning:

If it’s a topic they are keen on they go, but it depends on who is presenting. At the other end, some [staff] we don’t see all year unless it’s whole school and compulsory. Whole school PDs are not always successful. We’ve had a few where what was presented wasn’t what I thought we had agreed – it came across to the staff as ‘we’ve done this before and you’re babying us’. We’ve had a couple of these in the last couple of years so it doesn’t help with the overall perception. [INT-PLC-140508]

The role of ICT in these weekly professional learning sessions was largely skills focused, as
pointed out in this comment:

The school is at the very early stage of trying to bring ICT into the school. If people don’t know how to make things work they won’t even try to use them. So there is no emphasis on the pedagogical use of ICT at this stage, it’s just on skills. [INT-PLC-140508]

In Term 3 all staff were required to participate in professional learning teams that undertook action research projects in the areas of ICT, cooperative learning, inquiry learning, differentiation across the curriculum, integrated learning and team teaching. Whilst leaders in the school perceived that these were more highly valued by staff than the weekly sessions, the outcomes from these teams were variable:

Each team works to varying degrees, whereas other groups don’t work at all. Communications have broken down and they struggle to get it. [INT-PLC-140508]

When talking about the number of professional learning teams who explored the influence of technology on their teaching, another teacher with leadership role suggested that the effect of the professional learning on actual teaching practice was limited:

It will be very interesting to see whether it actually alters what happens. [INT-ISH-140308]

A possible reason for this degree of scepticism about the impact the professional learning teams were having may have been related to the ad hoc ways in which teachers shared the outcomes of their projects. The time originally allocated to sharing and reflecting on the outcomes of the projects was reduced when school leaders used this time for other activities, such as completing the ePotential survey (see 4.3.1) and discussing the outcomes of the triennial school review. Without the opportunity to share what was being learned through these projects, the learning was not disseminated across the staff.

**4.3.1 ePotential**

As part of the ePotential initiative (Department of Education and Early Childhood Development, 2009), all teachers in government schools in Victoria are expected to complete an annual online survey about their ICT capabilities. Once completed, individual teachers can see where their ICT capabilities in seven key areas are positioned on a four level capability continuum (Figure 1). The process around the survey of capabilities emphasises professional development rather than focusing on measuring skills and capabilities. Teachers are able to access online suggestions and a wide range of ideas and resources to support their movement along the continuum. Results of the ePotential survey will be discussed in relation to the
practices of the more experienced teachers at the school in section 5.2.

![Figure 1: ePotential ICT Capabilities Continuum](image)

Tensions emerged throughout the year regarding implementation of the ePotential survey. The Professional Learning Coordinator did not see ePotential as “part of my responsibility, others are taking care of that” [INT-PLC-140508]. The leader of the Learning and Teaching Coaches was keen to see the survey tool completed by all staff so that results could be compiled and used to inform and drive professional learning in the following year. Further, she wanted staff to be encouraged to make use of the professional learning resources that could be accessed within the ePotential online environment. These resources focused strongly on ways to shift pedagogy when using ICT in learning and teaching. However, those with
responsibility for ePotential within the school felt differently:

I have more than enough to do already chasing up people who haven’t done it and now you expect me to do all this as well! I didn’t even know that part of ePotential existed. [FN-ITCtee-ISH-160608]

This comment suggests some possibilities – first, the person with ePotential responsibilities was feeling the pressure of workload, and second, teachers at RiverValley Heights were reluctant to do the survey, let alone interrogate the online resources associated with the ePotential ICT Capabilities matrix. That is, teachers would do as much as required to comply with requirements set by the Department. The confusion about responsibilities for the professional learning aspects associated with the ePotential exercise, combined with lack of knowledge of the resources by those in leadership positions, may also have lead to staff not being aware of or accessing the resources associated with using ICT more effectively.

Another possible explanation for the lack of uptake of the ePotential resources was that staff was required to use the Departmental email system, edumail, passwords to access the ePotential online resources. Staff at RiverValley Heights generally used a school-based email in preference to the centralized edumail service, with edumail emails diverted to the school email address. Very few staff actually knew their edumail passwords.

4.4 Organisational practices and realities

Organisational policies and practices at RiverValley Heights sometimes took a material form that influenced teachers’ decisions regarding their integration of ICT. This section reports on some of these material realities and how they shaped the attitudes of teachers to integrating ICT.

Booking systems

RiverValley Heights used an online booking system for the majority of the portable ICT devices as well as all the computer labs. All teachers were supposed to make use of the booking system, but not all did:

Not all staff follow the procedures. They just help themselves to the equipment without booking it. [FN-ICT-ISH-230408]

Lack of compliance with booking systems lead to complications with accessing computer-enriched spaces. For example, on one occasion Lisa had booked a lab only to find out that another class was given priority over her booking to complete a Principles of Learning and
Teaching survey:

Computers have been a real struggle. I’ve got a computer lab booked but it’s being used for the PoLT surveys by one of the other classes. The survey takes about 10 minutes to do so I’ll send one of the kids up to see if it’s empty. We’ll move up there once they’ve finished. [INT-Lisa-020608]

The class did move to the computer lab, but shortly after settling the students into their task Lisa’s class was asked to leave, as revealed in this field note:

Lisa had been mistakenly told that the lab would be used for the survey in the first part of the period but the teacher in question arrived in the second half of the period. So Lisa’s class logged off their computers, vacated the lab and waited around outside until the class doing the survey had finished. Fifteen minutes later Lisa’s class was able to go back into the lab, log back on and resume their work. The class finished fifteen minutes later – some of the students would have done a total of about fifteen minutes work for the entire period. I asked Lisa about her reactions to this incident. She replied ‘This is just typical. I can never trust the booking system.’ [FN-Lisa-020608]

In this incident, which Lisa felt was ‘typical’, the unreliability of the booking system and of other teachers’ adherence to their booking interfered significantly with Lisa’s plans for her class.

On a different occasion Lisa wanted to use a video camera, but when she realised she had to use the online booking system, expressed her exasperation at how much effort she needed to go to in order to get access to the technology she wanted, saying “I just get tired, it get’s too hard so I don’t bother” [IT-Lisa-160608].

Later in the year the staff were asked to swap to the Portal [intranet] booking system. However, many staff complained about the lack of reliability of the booking system:

We’re supposed to book stuff on the Portal but the bit of the Portal that supports bookings doesn’t work. It really annoys me – it happens often enough. If you want us to do it one way make sure it bloody well works! [INT-Kerrie-080908]

During discussions about the decision to acquire class sets of netbook computers under the Digital Education Revolution initiative, the IT Committee debated procedures to be established for booking the netbook computers. The Assistant Principal directed that:

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2 The Principles of Learning and Teaching (PoLT) survey is a compulsory student survey about learning and teaching quality undertaken annually in all Victorian government schools – completing the PoLT survey takes precedence over classes already booked into the computer labs
They must be booked on the Portal. There needs to be a principle that the mini-computers need to be easy to book and no hassle for anyone. [FN-ICT-AP2-180908]

A possible implication of his comments was that the current booking system was a ‘hassle’ and that such ‘hassles’ needed to be removed if the new computer equipment was to be used.

**Keys**

Another barrier, albeit a seemingly small one, at least in a physical sense but with large ramifications, is that teachers at RiverValley Heights were not all given keys to the computer labs. Keys, like the portable data projectors, were kept in the Library and access to them controlled by the library staff. Teachers had to demonstrate that they had booked the computer lab before being permitted to take a key.

During the class described earlier where Lisa had taken her students to one of the computer labs, she arrived to find the lab locked. This excerpt from my field notes, continuing from an earlier recount, describes what happened when Lisa’s class arrived at the computer lab:

> The computer lab is locked and Lisa needs to find a teacher who has a key – she doesn’t have a key that opens this particular lab since not all teachers are issued with keys to every room in the school. Five minutes later she manages to open the lab and the students enter. [FN-Lisa-020608]

Staff found the need to visit the Library to collect keys inconvenient and disruptive. However, a member of the IT Committee at a meeting offered an explanation of why control of the key to computing spaces was in the hands of the library staff:

> Some teachers just expect someone to walk behind them and tidy up, you know like plug things in, or take responsibility for equipment and stuff. I mean you can have 90% of your staff doing the right thing and locking things up and plugging them in so they’re charged, it only takes one or two to be lazy and the whole things disappears or doesn’t work because it’s not ready for someone else to come in and use. [FN-ITC-120508]

Controlling the keys was seen as a way of being able to identify those teachers who weren’t complying with expectations of use of shared equipment and of ensuring security of the computer labs.

The issue of keys dominated discussion at two of the IT Committee meetings observed during the year. With the introduction of interactive whiteboards in more teaching spaces, more keys were needed to access the cabinets built to store the cables, speakers and cords that connect the teacher laptops to the whiteboards. A committee member complained that staff kept losing
the cabinet keys. The Assistant Principal who chaired the IT Committee, flippantly suggested organizing the woodwork students to make extra large key tags, so that the keys would be more easily identified and less easy to misplace. Despite concerns about the inconvenience the Committee could not agree on a better process of managing access to the computer labs.

**Acceptable use policies**

Another policy that was observed to impact on learning and teaching related to the school’s rules for students’ use of the school’s ICT networks and equipment, contained in the Acceptable Useage Protocols printed in the Student Homework and Study Planner. The students and their parents had to sign the protocols. During one of Lisa’s classes in the Library, one of the librarians was checking that the Acceptable Useage Protocols had been signed. Students who didn’t have the Protocols signed or didn’t have their Study Planner with them were not allowed to use the Library computers. This affected approximately half the class who were unable to continue their research activities.

**Internet credits**

RiverValley Heights High School provided a limited amount of free Internet access to each student, after which they (or their parents) needed to pay for additional Internet credits. In many of the classes observed in the computer labs, a lack of Internet credits was a common story that meant that students were unable to complete the set work during class time. An experienced teacher, recently arrived at RiverValley Heights, commented that:

> When you make the students pay for their Internet credits they have to bring the $20 and it doesn’t happen. I won’t do anything that I know is going to fail so I just don’t get them to use the Internet at all. That is an issue sometimes, like I have a unit on issues coming up and ordinarily I would get them to jump on the Internet but I have to find other ways, I suppose I will photocopy articles. So I do all the work not them!  
> [INT-ET5-161008]

In Lisa’s case she stopped setting activities that required the students to access the Internet. As an alternative Lisa would upload a limited range of resources to the Portal, or set Internet activities as homework.

When You Tube and MySpace were available [they’ve just been blocked by one of the Principal team because of over use and escalating Internet costs] the kids used their print and internet credits and some of them are $20 in arrears. And the School allowed them to get there. It’s been a losing battle with the computers and I’m about to give up. I’m being asked whether I’m getting the kids to create, like digital stories and it, like it’s not going to happen. It’s easier and quicker for me to trust that they’re
doing it at home. Kids not getting to print, not getting onto the Internet, not getting a lab even when I’ve booked it, etc etc. Like I’d love to get the kids doing an Inspiration flow chart or something. [INT-Lisa-020608]

With these two teachers, the school-level policies about how access to the internet was managed acted to prevent them from planning further ICT-based classroom activities.

**Access to social media tools**

A decision was taken by school leaders to block access to MySpace, Facebook and YouTube in an effort to combat the growing incidence of cyberbullying amongst students. There had also been concern expressed by some staff that younger staff members:

were spending a lot of their preparation periods on Facebook communicating with people in the staffroom, and those people who weren’t on Facebook felt like they were really excluded, or ‘perhaps they’re talking about me.’ [INT-APrin1-190308]

However, one consequence of this decision was that teachers could not use online resources such as YouTube videos or MySpace in their teaching. This particularly upset teachers like Susie, who made extensive use of YouTube videos in her teaching.

I found these really good videos last night I planned to use in my class today and now I come in and find that I can’t. It is so frustrating. Now I need to work out something else to do. This is silly. YouTube is so good for using in Science. [INT-Susie-210508]

These examples of booking systems, keys, internet credits, acceptable use policies and access to social media resources highlight the tensions and the conflicting objectives and priorities that existed around computer networks and equipment in this school. Those teachers who were positively disposed to using ICT in their classrooms wanted more open access to ICT resources throughout the school to support their attempts to integrate ICT. However, policies and practices within the school, even those designed with good intentions to combat other problems, created material barriers that acted to discourage teachers from attempting to integrate technology, or to feel frustrated at how much effort was needed to cope with or work around the barriers.

**4.5 Chapter summary**

The physical geography of the school site combined with a large proportion of ICT-unfriendly teaching spaces appears to act against the integration of ICT into learning and teaching at RiverValley Heights High School. Teachers at the school competed for access to scarce ICT
resources and facilities, although the school was in the process of developing additional technology enriched learning and teaching spaces. There appeared to be a gap in leadership of ICT as it relates to learning and teaching since the departure of ICT ‘champions’. Attempts to fill this gap with external coaches were met with mixed results with some confusion over responsibilities, particularly in relation to teacher professional development around ICT. The ICT committee focused largely on matters relating to ICT infrastructure and resources, budgets and implementation plans, but not on the learning and teaching implications of its decisions around ICT. Practices and policies at the school aimed at overcoming some of the problems associated with ICT, such as cyberbullying or the management of expensive resources, has a material effect on the ability and propensity of teachers to integrate ICT into their learning and teaching.
Chapter 5 – Practising within a community

5.0 Introduction

One of the questions driving this study was to examine if existing practices within a school have an influence on the practices developed by graduate teachers. In this section I present the findings about the practices of the more experienced teachers at RiverValley Heights High, that is, the practices of the community of teachers. I present views about the prevailing pedagogical approaches taken by the more experienced teachers with whom the graduate teachers worked most closely. I also present views about how the more experienced teachers within the school integrated ICT. For each of these questions I draw upon perspectives from three different stakeholder groups – those in influential leadership positions within RiverValley Heights High, from some of the more experienced teachers themselves, as well as views from the student body.

5.1 Teacher-centred practices

The findings of the study suggest that, whilst a variety of pedagogical approaches were taken at the school, the majority of the more experienced teachers adopted a highly teacher-centred approach in their classrooms. This view was expressed by a number of those in school leadership positions. For example, the Principal, when discussing the prevailing pedagogical approaches taken by the staff at the school said:

> Many of the younger teachers, and some of the older teachers don’t seem to struggle with the idea that I’ve got to know more than the kids. But for most of the teachers here, the whole model of moving to a facilitating role for the teacher rather than the knowledge bank is a huge one. [INT-Prin-070308]

The Learning Coach team leader, who had been working across the school with teachers to facilitate greater ICT integration, reinforced his view:

> Basically they [the teachers at the school] do various topics, follow whatever’s been given to them [by the key learning area coordinator], what the textbooks state. It’s the same old scribe at the front of the room and they’re rolling out a lecture approach… the whole class will be focused on the one tool instead of having the students do all sorts of things. They are the scribe at the front of the room. [INT-L&T1-160408]
These data suggest that the prevailing pedagogical practices taken by most of the teachers at the school was perceived by those in leadership positions as one of teacher as the source of information, delivering information to passive students. Content was strongly directed by textbooks.

RiverValley Heights was also undergoing its triennial school review process at the time of this study. During this review an independent reviewer assessed the school’s performance in a number of key areas, including learning and teaching. The leadership team presented the independent findings at a mid-year staff meeting. The review process concluded that the school was a ‘good school, but underperforming’ [ART-REP01-080908]. The report identified a lack of differentiation for individual students, except for addressing the need of students at the ‘bottom end’ who were well supported, whereas the curriculum was not challenging enough for the ‘good’ students. The review also found that there was no clear agreement amongst staff and school leadership about what is good teaching and that there were issues with current assessment practices, which were seen as too focused on tests. Again, this data suggests that pedagogical practices generally across the school do not align with what is considered in the literature and by the Education Department as leading pedagogical practices, which include differentiation of learning, and a variety of both formative and summative assessment practices.

In the course of this study I interviewed some of the more influential senior teachers, such as those who headed up discipline departments into which some of the graduate teachers taught or who acted as mentors to the graduate teachers. Discipline heads were responsible for overseeing the development of the curriculum in Years 7-10, and therefore had significant influence on the curriculum that guided what happened in the graduate teachers’ classrooms. As mentors to graduate teachers they also had the potential to influence the specific approaches taken in the graduate teachers’ classrooms. One of these senior teachers, who was held in very high regard by both school leaders and many of the graduate teachers, and considered a highly professional and effective teacher, expressed a strong preference for teacher-centred pedagogical practices:

> When you do teacher centred you have more control over what the kids learn, when they learn it, how the lesson runs, the discipline, the whole thing. I need to know I can control the class before I try anything student-centred. [INT-ET1-160408]

Her views are suggestive of an emphasis on control and a belief that students are less controllable when other pedagogical practices are employed. Her views also imply a strong sense of responsibility to ensure that students learn what they are supposed to learn.

She went on to discuss previous attempts at RiverValley Heights to adopt more student-
centred approaches:

In theory it’s a great idea and its good for things like team working skills and cooperative learning, and even trying to get the kids to see the connections across the curriculum, how it might fit. But in practice I don’t think it’s had any real benefit. [INT-L&T1-160408]

This suggests that prior experience at adopting different pedagogical practices had not met with success, as measured by this teacher’s perceptions about student learning.

Further, her view was that students did not want to have student-centred learning approaches, for example:

And the kids expect teacher centred. Like in Maths, they know that we will explain things, go through some examples, then go around and help each student individually. It’s what the students get used to and what they expect. Students want to be taught, do their work, do the test, and move on. [INT-ET1-160408]

Another senior teacher, who taught exclusively in VCE years 11 and 12 and who worked closely with one of the graduate teachers, reflected that she might ‘lecture’ her students a little too much ‘but it works for me’ [INT-ET2-161008]. When questioned further about whether it works for the students she responded ‘for most it does, but probably not all of them, but then nothing works for everyone. But most of my students [in VCE] are ok with this’ [INT-ET2-161008].

In an interview with another experienced teacher, a troublesome Year 7 class became the topic of conversation. This emerged within a discussion about the broad concern among staff at the growing student behavioural problems being experienced at RiverValley at the time, both in the schoolyard and in classrooms. During the fieldwork phase of the study I observed, on a small number of occasions, students climbing out of classroom windows during class times, throwing chairs out of windows and generally displaying disrespectful attitudes towards some teachers. Whilst not everyday occurrences, the increasing frequency of these more extreme behavioural issues were of concern to the staff. This particular class had a reputation for inappropriate classroom behaviour that frustrated their teachers. The teacher was recounting a conversation she had conducted with them that attempted to understand what the underlying issue was:

This morning I had just had enough of their behaviour. So I sat them down and said ‘Look you guys, I know you’re not stupid so why are you always mucking around like this?’ And do you know what they said? One boy said ‘Miss, you need to make it funner.’ [INT-ET3-120808]
The student’s response suggests that he was not engaged by what was on offer in the classroom, that the learning wasn’t ‘fun’. The negative perceptions about learning expressed in this exchange were reinforced by the students across the school. As part of the triennial school review process the independent school reviewer held a series of student focus groups seeking their feedback about the school. The students’ comments were provided in summary form to RiverValley Heights staff, and are outlined in voured only one learning style.

Table 4.

The comments made by the students suggest they felt that their learning could be more engaging. The students felt there was too much dependence on textbooks that directed their learning and not enough hands on activities where students could really engage in learning that they felt was more relevant to them. The students commented that there was inadequate variety of teaching styles and that current approaches favoured only one learning style.

Table 4: Summary of students' comments from RiverValley Heights High School Triennial Review Focus Groups, 2008

<table>
<thead>
<tr>
<th>Teachers make class work boring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some teachers lazy and only teach out of text book, not interesting</td>
</tr>
<tr>
<td>Try different teaching methods, hands on activities</td>
</tr>
<tr>
<td>Need to use different techniques and more hands on activities</td>
</tr>
<tr>
<td>Teachers need to encourage and be motivational;</td>
</tr>
<tr>
<td>Do work suited to different types of learning styles</td>
</tr>
<tr>
<td>Allow technology to be brought into the classroom</td>
</tr>
<tr>
<td>More relevant classroom work</td>
</tr>
<tr>
<td>Feedback to students regularly</td>
</tr>
<tr>
<td>Improve teacher quality.</td>
</tr>
<tr>
<td>More time for computers in class</td>
</tr>
<tr>
<td>Attention seekers waste teacher time</td>
</tr>
<tr>
<td>More laptops for students</td>
</tr>
</tbody>
</table>

Source: Summary of findings from independent school review; presented at whole school staff meeting.

The findings of this section show a school where the dominant pedagogical practices were strongly teacher-directed, textbook dependent, focused on information transmission, and where the most common assessment practices were test-based. These findings also suggest that the more experienced teachers are comfortable with these practices and believe that they
lead to the most effective learning outcomes for students. Further, they believe that this is what the majority of students expect and want from them. In contrast, the student perspective is that such pedagogical practices are not relevant or engaging and are seeking more differentiated pedagogical practices from their teachers. There seems to be a gap between the teachers’ views and those of the students.

5.2 Limited scale and scope of ICT integration

In this section I present findings about the extent to which ICT is integrated into learning and teaching across RiverValley Heights, drawing again on the multiple perspectives of school leaders, experienced teachers and the students.

The Principal acknowledged the importance of integrating ICT into classroom practices but felt that the school as a whole was still grappling with the challenges associated with this goal, as expressed in this statement:

To me, it's [ICT] the way we’re going and we need to go a long way still in that area. We seem to have stalled a lot. For curriculum use in the classroom, I still think we’ve got a long way to go. [INT-Prin-070308]

His view was that the school had achieved a great deal in terms of the ICT infrastructure within the school, and its use in school administration and communications but that classroom use of ICT was not as prevalent as it needed to be.

The senior teacher with responsibility for coordinating professional development at RiverValley Heights shared this view. She suggested that classroom integration of ICT was:

at a pretty basic level at the moment for the majority of staff. Only about ten percent of the current staff are highly competent at using ICT in their own teaching, half are somewhat interested and willing to have a go if we give them a bit of a nudge and 40% need a bit more work and incentive to get them to go along. [INT-PLC-140508]

This implies that the extent of ICT integration in classrooms across the school was low. Further, some of those in leadership positions also felt that the nature of ICT integration at the school was limited to relatively unsophisticated and very teacher-centred approaches. For example:

They need every student sitting in front of a computer and go step 1, step 2, step 3 regardless of whether some of the students have done this five times already and can already do it but another group in the same class hasn’t. [INT-ISH-230408]

Another view put forward by a teacher in an ICT leadership position at RiverValley Heights
commented that the use of ICT was mostly limited to layering ICT onto current teacher-centred approaches:

 Rather than change their approach to how they manage and interact with the children and how they teach, the ICT just comes in on the side. They use it to do what they have always done, which is mostly give them [students] information. They use PowerPoint instead of writing on the board, [INT-L&T1-160408]

These two views suggest that the majority of teachers at RiverValley Heights adopted a very teacher-directed pedagogical approach when using ICT that takes little account of student ability or prior learning, and where ICT is used predominantly to deliver information. In the view of this experienced teacher, many teachers at the school layered their technology use over existing transmissive pedagogical practices.

The view that ICT integration was limited in both scope and scale was reinforced by RiverValley Heights’ annual ICT capabilities survey of staff, ePotential (introduced in 4.31. A summary of the aggregated results of RiverValley Heights ePotential survey, prepared by an Education Department Regional officer, was tabled at an ICT Committee meeting I attended during the fieldwork phase of this study. The results reinforced the very strongly teacher-directed pedagogical practices at RiverValley Heights High. Across the school, 73% of ICT use by students was at the direction of the teacher, compared to only 11% of teachers who allowed their students to negotiate and manage their use of ICT in the classroom. The most frequent purpose for using ICT use in learning and teaching cited in the ePotential results summary was to:

- provide students with a range of quality information
- to encourage students to create information products that demonstrate their knowledge and understanding of concepts and issues
- to use ICT to represent ideas and understandings to audiences.

The ePotential capabilities matrix identifies a range of learning and teaching uses of ICT that would categorise a teacher as having ‘innovative’ or ‘transformative’ ICT capabilities. These include encouraging students to use ICT:

- for problem solving
- for reflecting and evaluating their learning
- to plan and monitor their projects
- to personalise their learning
• to support collaborative teamwork
• to support students hypothesising, synthesizing information and create new knowledge
• to share ideas and solve problems beyond the school. [ART-ePotential summary results, RiverValley Heights High School, 2008]

Few teachers reported that they encouraged students to use ICT for problem solving, for reflecting and evaluating their learning, to plan and monitor their projects or to personalise their learning. Very few teachers reported using ICT to support collaborative teamwork, to support students hypothesising, synthesizing information and create new knowledge or to share ideas and solve problems beyond the school.

The report of the survey results also indicated that the frequency of use of ICT for teaching and learning across RiverValley Heights is minimal. Teachers reported that the most frequent use their students made of ICT was to use presentation software to communicate concepts and use email, but that they did these things only occasionally to regularly. Teachers reported that they only occasionally had students locate information on the Internet, or use tools like spreadsheets. Teachers reported that they never had students use chat or forums, or have students participate in collaborative projects using ICT, or a range of other more innovative uses of ICT by students including animations, visualization software, video or music editing, digital portfolios or multimedia products.

In other words, the survey results suggest that the majority of teachers at RiverValley Heights were only at either the foundation or emergent levels of ICT use for learning and teaching. The majority of teachers at RiverValley Heights reported that they used ICT to most commonly to deliver information, and that the students used ICT, but not very frequently, primarily to represent their learning. More innovative uses of ICT, such as ICT to support collaboration or to facilitate higher order thinking and problem-solving were never used by teachers at the school. In summary, the ways in which ICT were used at the RiverValley Heights were unsophisticated and infrequent.

Some of the comments provided by the students about the learning and teaching at RiverValley Heights, presented earlier in Table 4, suggest that they would like to see more ICT being integrated into their classroom activities, by ‘allowing technology to be brought into the classroom’ and by providing ‘more time for computers in class’ and ‘more laptops for students.’ However, a comment made by one of the more experienced teachers about technology during raises the issue of how ICT is used and for what learning and teaching purposes:
a couple of years ago with some Y8s we ran an experiment with traditional equipment and the same experiment with technology and we asked the students which they preferred and they all preferred the traditional approach. [INT-ET1-161008]

One interpretation of the apparent contradiction between the students’ desire to see more ICT used in their learning and the adverse reaction by the Y8 students outlined above, is that blanket use of ICT is not necessarily what is desired by the students, but relevant and engaging uses of ICT.

To summarise, the majority of teachers at RiverValley Heights High School generally made infrequent and relatively unsophisticated uses of ICT in their teaching. The majority of the teachers at the school were still in the foundation or emergent stages along the Education Department’s ICT capabilities continuum. The most frequent use of ICT in classrooms at RiverValley Heights was to deliver information to students as a substitute for more traditional modes of information transmission. Students seemed to desire more access to technology in the classrooms and to see computers being used more frequently, although some teachers perceived students as preferring more traditional methods in some discipline areas. Those in leadership positions across the school felt that the majority of their teaching colleagues were not integrating ICT to the extent or in ways that were transformative.

5.3 Stable pedagogical practices

During the study it became apparent that there was a strong perception of resistance among many of the more experienced teachers to embracing change of any sort, whether it was to their pedagogical practices generally, or with integrating ICT, or both. This section reveals the perceptions about attitudes to changing practices shared during the research by RiverValley Heights’ leaders and more experienced teachers.

A key factor that characterised the teaching staff at RiverValley Heights was the relative stability of the staff since it opened in the early 1990s. According to one of the Assistant Principals, a third of the staff, including her, had been at RiverValley Heights since it opened:

> There was a whole group of young teachers who started as graduates here together who formed really strong friendships, who bonded really well. They didn’t think about moving on either in terms of their careers or onto other schools until about five years ago. [INT- AP1-190308]

The Assistant Principal also observe that one of the consequences of such a stable staff was a reluctance to change:
The culture of the school doesn’t change. Teachers who are in the similar age and experience bracket haven’t had many new ideas and inputs through staff turnover. So you hear things like ‘we’ve tried that before, it didn’t work, we’re not trying that again’. Even if the change is only vaguely similar, it’s ‘we’re not doing that again. I’ve heard teachers say to graduate or new teachers ‘this is what we do at RiverValley Heights’ and that’s a blanket rule. [INT-AP1-190308]

Another senior teacher in a leadership position stated in an interview that the school had adopted a fairly ‘organic’ approach to growing ICT at the school, partly because leaders were reluctant to force new approaches on staff since:

in a school this size there’s [sic] a few people who are fairly stubborn about being told what they have to do as opposed to discovering it for themselves and coming on board. I think teachers tend to be fairly conservative and they tend to think there is nothing wrong with what they’re doing, so why should they learn something new? [INT-ISH-230408]

It is possible to infer from the comments made by these two senior staff that some of the more experienced teachers at RiverValley Heights were reluctant to adopt new approaches to their teaching, including integrating ICT.

It was not within the scope of this study to examine in detail the attitudes and practices of all the teachers in RiverValley Heights, which may have been a way to verify these perceptions. However, there was one example of the attitudes of some of the more experienced teachers towards integrating ICT that I came across during my fieldwork that is of note. In an interview with one experienced teacher who shared a staff room with three of the graduate teachers he admitted that he rarely made use of ICT in his own classroom stating that:

I suppose I could use the laptop and hook it up to the TV but that means I would have to prepare, you know, PowerPoint and do like a lecture instead of writing notes on the board. [INT-ET6-210408]

This statement was made with a tone of incredulity that hinted at the extra bother that having to prepare PowerPoint presentations would create. It also suggests that this teacher was considering uses of technology that layered on to existing pedagogical practices, replacing written notes on the board with electronic versions of those notes, rather than viewing technology as a catalyst for developing or adopting new pedagogical practices. I later checked with two of the staff in leadership positions in the school how typical such an attitude might be. They both confirmed that this was not an uncommon attitude, particularly amongst the older and more experienced staff.
The Principal attempted to explain this reluctance in terms of fear of change and fear of technology. He said, “...there really is a strong fear factor in some teachers, particularly the older ones” [INT-Prin-070308].

However, some of the more experienced teachers offered an alternative account that suggests that teachers’ decisions are not based on entrenched resistance to change but are based on prior experience. For example:

We like to think it’s [ICT] important and we’d really like to use it more and we’ve bought things like data loggers and the like but it then becomes a behaviour issue. They say they are really easy to use but they aren’t and you end up having to manage the technology and work out why it doesn’t work properly and while you do that you lose the students and lose control.

So we went back to what we know works, the test tubes, the Bunsen burners. And when you are doing a more traditional prac with traditional equipment, you know it’s going to just work. [INT-ET1-161008]

Another experienced teacher in the school made the following comments about implicit assumptions made that:

experienced teachers are ignorant about ICT, that they haven’t thought about these new ideas like technology and learning styles. They shouldn’t make assumptions about what we do or choose not to do. It’s not a knee-jerk reaction to not use technology. [INT-ET2-210508]

She was at pains to point out that she:

wasn’t anti-technology. In fact, I asked for a data projector in my room so I can show interactives about differentials. But the interactive only goes for about three minutes but it takes me about half an hour to set it up so I don’t bother. [INT-ET2-210508]

Both these data suggest that there are other factors at play in experienced teachers’ decisions to adopt a new approach, such as integrating technology into their pedagogical practices. In both cases the teachers were expressing the lack of confidence in the reliability of technology and the complexities using technology adds to their teaching compared with more traditional, non-technology approaches. Despite the perceived advantages of technology these two teachers did not believe that the benefits in terms of student learning outweighed the extra effort required to make the technology work.

Later in the year, one of these teachers was really excited to share her experience in using a web site to help teach her Year 11 Maths students calculus. When asked whether the use of
ICT in this instance had helped her teach more effectively, she answered, emphatically:

Yes, because once the students got past his voice, they really liked it because he has these diagrams and they moved. It showed the dynamic aspects. I think it’s the first time my students have really understood the concept of limits. [INT-ET2-050908]

This implies that this teacher had found an approach to teaching her students that she was comfortable with and which produced the sort of VCE results she felt were reasonable. Any change to her approach, including the integration of ICT, needed to generate demonstrable improvements to her senior students’ assessment scores. Her story suggests that she was open to the idea of integrating ICT into her current teaching practice but only when she could be sure that there was a benefit to her teaching and to her students’ learning that outweighed the inconvenience that frequently accompanied the use of ICT.

The data presented in this section suggests that the teachers, particularly the more experienced teachers, are positioned by most of the leaders in the school as being resistant to ICT integration, and to changing their pedagogical practices. The school leaders offer three main reasons for this reluctance - fear of the new, a general complacency resulting from the unusual closeness and stability of the more experienced staff at the school and the departure of those in the school who had ‘championed’ learning and teaching and ICT. Some of the more experienced teachers however, offer alternative accounts that suggest that some of them, at least, are making deliberate choices about their practices based on prior experience with technology and their beliefs about what approaches are most effective for them in improving student learning outcomes.

5.4 Chapter summary

The findings of this Chapter suggest that, at the time of this study, there was a view among school leaders, some of the more experienced teachers and students of immutable teaching practices amongst the majority of the more experienced teachers at RiverValley Heights High, who had limited competencies in integrating ICT and a reluctance to change. Technology was being layered onto existing, strongly teacher-directed practices, with limited differentiation or personalised learning based on students’ abilities and prior learning, rather than teachers modifying or changing their pedagogical practices when using ICT. The gaps in ICT integration into the school’s curriculum posed a significant challenge to the school leadership team which was aware of the importance of ICT integration but felt the resistance of some of the existing community of experienced teachers to changing their practices.
Chapter 6: ICT and pedagogical practices of the graduate teachers.

6.0 Introduction
I briefly introduced the graduate teachers in Chapter 3. In the first section of this Chapter, I re-introduce the graduate teachers in greater detail by examining their beliefs about learning, teaching and the role of ICT. This is followed by an analysis of their prior experiences of using ICT and of seeing ICT being used in the classroom during their teacher preparation programs. These two sections together paint a picture of what the graduate teachers know about ICT-based pedagogical practices and what they espouse to be their practices. I follow this with findings and analysis of their enacted practices, that is, how they actually attempted to integrate ICT and in doing so, what pedagogical practices they adopted during the period of this study.

6.1 Beliefs about learning and teaching
This first section examines what the five graduate teachers in this study brought with them to their teaching careers, that is, what the graduate teachers knew about learning and teaching and specifically the role of ICT within that. The abstract knowledge, or knowledge about learning, teaching and ICT, derived from their own educational experiences and beliefs, forms the starting point for their teaching practice and specifically for their use of ICT as part of that practice.

6.1.1 A good teacher is…..
Without exception all the graduate teachers had trouble articulating their personal philosophies about learning and teaching at the beginning of my fieldwork. To some it felt like a question they had left behind in their university studies, and they all stumbled over their words when they tried to explain what they believed. For example when asked this question Kerrie said, “Oh that’s such a uni question. God, my brain doesn’t work that way anymore” [INT-Kerrie-170308]. Most admitted that they hadn’t paid much attention to ‘theory subjects’ whilst they undertook their teacher education programs with one saying that she “rarely went to theory lectures and after my first placement I didn’t believe anything the lecturers said” [INT-Kerrie-170308]. Louise admitted that she:

Probably didn’t value highly the theory that was thrown at me. The practical side was good, teaching rounds, anything that would help me with how to teach. I don’t think
that way, didn’t sit and think about theory still not. I’m a practical person and I don’t really look to theories for those solutions. [INT-Louise-030608]

To help identify more clearly what they really believed, I subsequently asked each of them what they thought a good teacher was. Some common themes emerged from the fragmented discussions around pedagogical beliefs.

**...someone who builds a positive relationship with their students**

Paramount among these themes was the importance of establishing a positive relationship with the students. To some of the graduate teachers, this involved putting the needs of the students first:

- someone who puts the kids’ priorities, you know, before anything else. [INT-Lisa-160508]
- a good teacher has the priority of making sure the students’ learning needs and development needs come first. [INT-Louise-050508]

To do this it was imperative to build a positive relationship with the students, to know the students and to value them:

> If you ask me to answer in one word, it’s rapport. That’s my philosophy. A good teacher is someone who values the personalities and the contributions that are made within the classroom. [INT-Lisa-170308]

> …able to build good relationship with the students. [INT-Louise-050508]

> A good teacher knows their students. [INT-Kerrie-280408]

Lisa felt it was important to be a positive role model for her students, to instil a set of values of mutual respect, “how to respect each other” [INT-Lisa-170308]. But for Louise it was more than just being liked. She felt a strong responsibility to act professionally and to emphasise her role in supporting her students’ learning:

> I care about them and their learning so they need to understand that the learning comes first but that’s how I show them that I care in the classroom. They see that I’m working hard for them and that I want them to succeed. [INT-Louise-050508]

For both Lisa and Louise, these beliefs are grounded in their own experiences at school. Both referred to strong role models they experienced from their own teachers in secondary school. Likewise, Susie believed that the positive relationships that she saw being built between students and teachers whilst on her practicum placements prior to commencing at RiverValley Heights High was an important approach to emulate, typified by the following comment:
their [teachers’] attitude to the students, like the students mattered, and they [teachers] knew all their students so well and had a light hearted approach in the classroom [INT-Susie-300408].

But for Susie, at the centre of the relationship was a focus on learning and “making them [the students] work” [INT-Susie-300408]. Kerrie also felt that establishing a rapport with students was important so that the students felt they could approach her with questions. For her a good teacher was one “that the kids can talk to or ask questions without fearing they’re wrong” [INT-Kerrie-280408].

For Lisa and Louise it was more important to focus on and build positive relationships with their students than to focus on knowing the content of what they were teaching:

I know how to do the Maths and even History. If I’m teaching something I haven’t learnt before I can find the information I need to know, I’m capable of doing that. [INT-Louise-050508]

For Lisa, teaching content was a way to instil good learning habits and values that would set the students up to be “participating members of society.” [INT-Lisa-160508] She felt as a graduate teacher that she didn’t know enough of the content that she was expected to teach, but:

I tell myself that doesn’t matter because I don’t remember what I did in Year 9 but I did remember that I had a positive role model that I could, you know, modify my behaviour. [INT-Lisa-160508]

The idea of being a role model was a theme picked up by Kerrie and Simon. For Kerrie, being a teacher meant, “being more or less a good role model” [INT-Kerrie-280408] whilst Simon also stressed the importance of teachers “teaching the kids what respect is about” [INT-Simon-210408].

...someone who engages the students in their learning

Engaging students was a second common theme that many of the graduate teachers tried to express. Simon felt that a good teacher was:

someone that creates an environment where the kids are happy to firstly be in and want to be there and who can inspire the kids and motivate the kids to actually try and do stuff. [INT-Simon-210408]

Kerrie felt that good teachers had to “be enthusiastic – if you’re not enthusiastic kids aren’t enthusiastic” [INT-Kerrie-280408]. Lisa felt that engagement came from good teachers who made learning more relevant by “adding meaning to what they taught through their own life
Simon, Kerrie and Susie were strongly focused on developing opportunities for the students to be actively engaged in learning via hands-on activities. This may also reflect the disciplines they taught, Materials and Science respectively. Simon had previously taught Maths and was disappointed at how quickly the students developed negative attitudes towards Maths, even when he tried to make the content more relevant to their lives. He found that teaching Materials was far more rewarding since the students were more positive, more motivated and engaged in the practical work they were doing and could see something achieved at the end of a lesson. Susie also believed that “practical activities are the most important thing in Science…I want to teach very practically, hands-on stuff” [INT-Susie-300408]. Further, Susie and Kerrie believed in trying to connect ideas and concepts to the lives of the students.

Kerrie preferred teaching in the older class levels where the students were more enquiring and asked more relevant and open questions. She believed:

as a teacher you shouldn’t really tell the students the answer – they need to learn it themselves and they need to make the connections themselves, otherwise you’re sort of not teaching them anything. I try not to given them the answer. I try more to direct them to the answer. [INT-Kerrie-280408]

The theme of guiding students to learning was repeated a number of times by Kerrie, who believes that:

Everyone’s inherently inquisitive and if you don’t know something and you want to find it out, if you’ve got a reason to find it out. If you don’t have a reason to find it out then you don’t care. But once you start looking into something then a lot of … I find a lot of kids start asking other questions and I think helping them find out that information is what a teacher is, not necessarily imparting your knowledge. [INT-Kerrie-280408]

Some of the graduate teachers believed that good teachers employ a variety of approaches in order to engage their students. Susie strongly believed in trying new ideas in her classes in order to keep her students engaged. Louise was very keen in her first year of teaching to try a variety of what she felt were innovative teaching she was exposed to at university, such as cooperative learning:

I didn’t want to be the traditional teacher. I wanted to be able to provide them with different ways of doing things and stuff like that. [INT-Louise-050508]
Commitment was another theme that most of the graduate teachers raised. For them being a teacher was something they felt strongly committed to doing and felt that good teachers “put in the effort rather than just rocking up” [INT-Kerrie-280408]. Louise and Lisa also both specifically commented on the need to “make a commitment of themselves” [INT-Louise-050508] to put in meaningful effort for the students. Kerrie and Lisa were scathing about some of the more experienced teachers at the school who they felt no longer had the commitment needed to be good teachers, who delivered very teacher-centred, transmissive and, in their view, boring lessons because “they’re [the teachers] over it, the novelty’s worn off” [INT-Lisa-160508].

All of the graduate teachers were proud to be part of the teaching profession. When asked what being a teacher means to them, they spoke from the heart with genuine feeling. Lisa felt that being a teacher meant she was privileged, to be able to work with young people and to learn from them as much as she taught them and, like Louise, Kerrie and Susie, was in a position of being able to watch them change and grow, knowing that she had played some part in that growth. Simon also felt that being a teacher meant being able to show students the possibilities the world could offer them and helping them understand “what they have to become or who they need to be in order to function in the real world” [INT-Simon-210408]. Being a teacher for Lisa, Kerrie and Susie meant helping students “find the knowledge that they’re looking for” [INT-Kerrie-280408] rather than “being a fountain of knowledge” [INT-Lisa-160508].

All of them wanted to still be teaching in five years time, some in positions of greater responsibility such as year level or subject coordinator, or teaching at more senior positions taking more VCE classes, or being more involved in the pastoral care aspect of teaching.

In summary, the graduate teachers shared a common belief in the importance of building strong, positive relationships with their students; in valuing their students and engaging them in learning; and being a committed professional, one who puts the learning interests of the students at the forefront and who can be a positive role model for their students.

For most of the graduate teachers their espoused beliefs about learning and teaching suggest a desire to adopt more student-centered pedagogies. The majority supported the idea of a teacher as being more of a guide rather than always telling, asking questions of students to encourage learning by the students rather than adopt more transmissive pedagogies. They all agreed that valuing the students and their contributions was important and some believed in the importance of using cooperative learning strategies. The graduate teachers stressed the
importance of engaging students by making their teaching relevant to the lives of the students. Their espoused practices are consistent with the types of pedagogical approaches that are identified in the literature as being best suited to getting the most out of ICT – using a variety of different strategies in the classroom, moving away from information transmission to more active, participatory learning.

6.2 Beliefs, competencies, confidence and experience with ICT

In addition to considering general beliefs about learning and teaching, I also explored with the graduate teachers their beliefs about the role of ICT in learning and teaching.

In Chapter 2 I identified two important factors in the literature that are believed to shape beliefs about how ICT might play a role in learning and teaching: individual competence and confidence in using ICT, both in personal and professional capacities; and prior experience in seeing and using ICT in educational settings, including their own schooling, tertiary education and through their pre-service education. The following sections explore the graduate teachers’ personal skills and confidence in using ICT, followed by an analysis of their prior experiences in seeing and using ICT in educational settings. This is followed by a brief exploration of the graduate teachers’ beliefs about the role of ICT in learning and teaching and how these factors shape the graduate teachers’ beliefs about their ability to integrate ICT into their own teaching.

6.2.1 ICT skills and confidence

The perceptions of skills and confidence with technology varied considerably among the six graduate teachers. Two of the teachers, Kerrie and Susie, have both used computers in their personal lives from an early age:

I’ve grown up with technology. Dad’s in IT so I’ve never not used technology. I had a computer in my bedroom when I was in Grade 6. I don’t remember not using technology. [INT-Kerrie-170308]

I’ve always had a computer at home since I was like in Grade 5 and, even before that we even had the really old tiny little Apple. And we always had the Internet since we were in Grade 5 I think, so I’ve always been able to use it. [INT-Susie-300408]

These two teachers were extremely confident in their personal skills with ICT. Both frequently used a wide variety of technologies in their everyday lives, including iPods, digital cameras, video cameras, computers, scanners and mobile phones. They were both familiar with a wide variety of software applications and were both regular users of social networking
sites such as Facebook. Given that this data were collected in 2008 it would be fair to call them both early adopters. Neither displayed any anxiety or doubt about their ability to master new technology applications or hardware. Technology for these two was very much just a part of how life is, including how life is in the classroom.

Both Louise and Lisa were more cautious in their assessment of their own ICT skills but did not see this as a barrier to using technology. When asked how she saw her level of ICT capability, Lisa reported:

I wouldn’t say strong, but I’m confident for my age group. I should know more stuff because I’m a media teacher, but because I’ve always done photography and the text-based stuff I haven’t quite had a good opportunity to look at stuff like Flash and Premiere and all that. But if the time came I’d do a tutorial or something like that. [INT-Lisa-170308]

Despite her self-assessment as not having strong ICT skills, Lisa did make use of ICT in her personal life to a great extent. She was a regular user of social networking sites and frequently downloaded music, image and video files from her computer to her iPod. Even though she did not know as many computer applications as she thought she should as a teacher, she was confident that she had the fundamental skills and understandings to develop sufficient familiarity with whatever applications she needed to use in the classroom. Lisa’s nonchalance about her own ability to ‘do a tutorial’ to improve her own competence in ICT applications suggests that she did not see her own lack of familiarity and competence in specific applications as a negative, nor did she see the need to be competent in all applications. Instead, she seemed to take a much more just-in-time approach to developing her technology competence, confident in the belief that she would be able to learn what she needed, when she needed to. She explained her confidence “because it is my generation” [INT-Lisa-170308].

Similarly, Louise was confident about her ability to use ICT even though she did not use a wide variety of technologies or software applications on a regular basis:

I feel pretty confident, even if I don’t know how, I’m usually pretty confident that I’ll learn it, pick it up pretty quickly if I need to. I’m not put off by using them [ICT] for myself, I feel comfortable to have a go at anything. [INT-Louise-130308]

But Louise was not a high level user of ICT in her personal life:

I probably don’t use [ICT] a lot because I don’t actually like it that much. It annoys me. I’m not the kind of person that’ll sit behind a computer or anything like that because I’d rather be outside doing something else. I use the Internet for banking, I pay my bills and all that stuff, but I’m not into Facebook or MSN or anything like
that because I’d rather talk to the person than, you know, do it over the computer because it bores me. I don’t know if we had the Internet at home when I did Year 12 but I didn’t use if an awful lot. You know I didn’t even have a mobile phone in Year 12. [INT-Louise-130308]

Louise was capable of using ICT but was not strongly pre-disposed towards ICT, preferring other ways of interacting with people.

Simon was the least technologically skilled of the graduate teachers participating in this study. When asked where he would position his own ICT skills he replied, without any hesitation:

Oh low. Really low. All of my ICT skills have come through bumbling my way through it. [INT-Simon-140408]

Simon made little use of ICT in his personal life beyond downloading music for his iPod and downloading digital photos off his camera.

Despite the variation in self-reported skills and knowledge of ICT applications, most of the participants in this study were highly confident in their ability to learn how to use new applications or devices. Most did not see it as important that they knew how to use a lot of applications or devices, but adopted a more just-in-time approach to using ICT, in that if they came across a new form of ICT they wanted to use, that is when they would engage with learning how to use it. Technology did not frighten them. Gender was not a factor in their beliefs about their ICT capability however age may have been a factor, in that the oldest participant, in his 30s, was the least confident in being able to keep up with technology. Even though most of the teachers in this study were all very confident about their capabilities in mastering new technologies, not all were predisposed to using technology.

6.2.2 Prior experience with ICT

Whilst the previous section examined the graduate teachers’ self-reported predisposition towards and skills in using ICT generally, this section examines their prior experience with ICT being used in educational settings, from their perspectives as school students, as teacher education students at university and their experiences of seeing and using ICT whilst on their teaching practica.

Experience during own schooling

The participants’ exposure to seeing ICT integrated into their own schooling appears to have been very limited. The oldest participant completed his secondary schooling seventeen years prior to the study, at a time when the use of computers in schools was embryonic to say the
least, observing that “When I was at school computers were used very little” [INT-Simon-140408].

The focus of computers when Simon was in school was very much one of learning about computers, and was mostly seen as a specialist area of study, rather than ICT being integrated across all areas of learning as currently suggested in current curriculum policies identified in Chapter 2.

Even the youngest teachers in this study used ICT in very limited ways in their own schooling. When asked what sort of technology they used when at school, they replied:

Just basically computers, to type up assignments and research on the Internet. And occasionally PowerPoint to do a presentation, but that would’ve been about it. [INT-Kerrie-170308]

At school I think I used them [computers] only for Accounting in Year 11. I don’t remember ever using computers…I might have used them once to research in Year 8. Oh, at school I used to make PowerPoints for oral presentations. [INT-Susie-300408]

At school we probably didn’t use it an awful lot. I did IT as one of my subjects at school but I didn’t use it for many of my other classes. I don’t remember ever going into a computer room for classes, only the IT subject. [INT-Louise-130308]

The experiences of the participants in using ICT in their own schooling suggest that none of the graduate teachers saw ICT being used in anything other than very limited and basic ways. For half the teachers, the use of computers during their own schooling was confined to a focus on IT as an area of specialist study. For all of them, the only ways they saw ICT being integrated into other areas of learning was as a word processor, a source of information and as an adjunct to an oral presentation. These data suggest that that graduate teachers in this study had very limited models of integrating technology from their own schooling experiences to inform their own beliefs about the role ICT might play in the classroom.

**ICT during teacher preparation**

The limited experience in seeing ICT use modeled in the school classroom was repeated for most of the graduate teachers during their teacher preparation. All of the participants were required to make use of emails and were expected to hand in assignments that had been word processed during their pre-service teacher education programs. All of the participants used some form of online learning management system, which provided a repository for lecture notes and other resources provided by their teachers as well as a facility for uploading the aforementioned word processed assignments. Some were expected to use online discussion forums or chat rooms that were created by their lecturers, however not all of them. All of the
graduate teachers attended lectures that were given as PowerPoint presentations, which were then, sometimes, uploaded to the learning management system. But, for most of the participants, that was the extent of the reported use of ICT in their pre-service teacher education programs. Very little, if any, ICT use was modeled in their programs, particularly in their method subjects, which were intended to focus on both content and pedagogies for their teaching method area. The following was typical:

At University it was all PowerPoints in our lectures, and then for the method area it was mostly PowerPoints for our notes. But our tutorials were really opportunities to discuss different techniques for teaching Science.

Researcher: And did ICT play a role in these tutorial discussions?

No, not really. [INT-Simon-140408]

Three of the participants in this study attended the same University where students in teacher preparation programs were expected to do at least one online course. Louise’s online course made extensive use of the online environment but not in ways that were consistent with Louise’s ideas about pedagogy. The site provided access to materials Louise was expected to read through for her subject, and in one subject conducted an online assessment in the form of a comprehension test:

You could look at it, print it off, close it [the site] down, find all the answers, go back in, fill in the thingos [sic] and get the answers right. It was silly because anyone could do it, all the answers were on the site. It was all through the stuff they had given us. It’s not showing anything. I don’t see it as a valuable learning experience or as trying to evaluate my understanding of the subject. So I just didn’t find that very useful. [INT-Louise-130308]

Louise’s use of technology during her pre-service teacher education program was otherwise limited to “typing up essays and lesson plans, those kind of things” [INT-Louise-130308]. She did not see any integration of ICT modeled in other subjects she took, including her method areas of Maths and History.

For most of the participants the role that ICT might play in learning and teaching was discussed but not modeled during their pre-service programs. The discussion seems to have been confined to higher order ideals about the importance of integrating ICT but with few, if any, practical ideas of how to go about this being provided. For example:

ICT was never pushed. It was discussed but never demonstrated. It was discussed in terms of ‘this is something you should be doing or thinking about doing in your classroom, every modern teacher needs to do it’ but it wasn’t actually ‘here are some
ideas of who or what to use’ or anything like that. [INT-Louise-130308]

Further, Louise was not convinced that the link between integrating ICT and student learning was made clear in her teacher preparation, which was a significant factor in her pedagogical choices:

I’ve never felt like I’ve ever received any good guidelines. I mean, there’s a justification that you talk about that these kids are growing up in a world of technology but even to link that to their learning??? Didn’t see it. [INT-Louise-130308]

Susie’s experience at a different university was a stark contrast to the other participants. She was required to take a compulsory subject that addressed ideas about integrating technology into classrooms and that provided opportunities for Susie to extend her ICT skills and to engage with a wide range of approaches to integrating ICT. Susie was also able to participate in a series of workshops designed to extend skills in a range of ICT applications commonly used in schools, such as how to use movie editing software and web authoring tools. Susie also had a methods teacher who made extensive use of ICT in his own teaching and who drew heavily on his own school classroom experiences to show examples of how he was using ICT to support his own teaching and his students’ learning.

With one exception, the majority of the participants had very limited practice in using ICT or seeing ICT used in innovative ways in their teaching preparation programs. The importance of integrating ICT was a key message they received, but most did not gain any first hand practical experience in how this might happen during their teacher preparation programs.

**ICT on practicum placement**

During pre-service programs each of the graduate teachers undertook a series of practicum placements in secondary schools. Once again, however, most of the participants were exposed to very limited uses of ICT in classrooms. The majority of the participants witnessed the use of PowerPoint presentations as a substitute for writing ‘notes’ on whiteboards or showing websites or DVDs on data projector screens. This was particularly the case for Simon and Kerrie, who both completed a practicum at RiverValley Heights High School. For example, Kerrie was keen to share how her mentor had used his laptop extensively to show PowerPoint presentations to his students and occasionally a video. Kerrie believed that replacing writing on the board with using PowerPoint presentations that contained pictures and short animations was more engaging for the students.

All saw word processors used by students to type up assignments and essays and extensive use of the Internet for research. Susie and Lisa were the two exceptions. Susie saw and made
use of a range of ICT whilst on her placement, including using interactive whiteboards, PowerPoint presentations and a range of online learning approaches. Lisa experienced a range of multimedia and visual software tools being used in her Media methods placement, but limited use outside of this discipline.

6.2.3 Beliefs about the role of ICT in learning and teaching

The beliefs about the importance of ICT in learning and teaching among the graduate teachers in this study were diverse.

Lisa felt that use of ICT was demanded by the teaching profession and from society more generally:

It relates back to job applications, you know it’s the profession that demands it. It’s coming from society, it’s coming from within. You know, I’m pressured to use it because kids, that’s what they relate to, you know. Yeah, pressured by the kids. [INT-Lisa-170308]

Lisa also saw using ICT as an important way of boosting her connections with her students and of tapping into their lifeworlds. Lisa acknowledged that her students are highly proficient at using ICT, saying they were “off the scale and they love using ICT and want to use it” [INT-Lisa-170308]. However, Lisa expressed some caution at moving too far into the lifeworlds of her students, for example by incorporating MySpace or Facebook into her teaching, saying “they might be a bit threatened by that because that’s their world” [INT-Lisa-170308]. At the beginning of the year Lisa was really keen to make use of the school’s intranet capabilities and had plans to establish discussion spaces and get students to post the assignments online, use peer assessment and a range of other ideas.

Like Lisa, Susie believes that she:

couldn’t not use computers because they’re part of what the kids do, they’re part of the kids, they ask, ‘are we using computers today?’ They’re thinking like that so we have to too. [INT-Susie-300408]

Susie sees using ICT as part of the way classroom need to operate:

Just like they’ve been given pieces of paper with questions and they answer the questions, you give them a computer and they do an activity and after a while they just do it because that’s what you do. [INT-Susie-300408]

But Susie expressed some caution at how computers or ICT might be used. She felt that at times students see the use of ICT as an opportunity to “slack off” rather than seeing computers as just another way of learning. Susie says:
They have to see the importance of learning, even if it’s on the computer. They have to, like, think, ‘we’re not going to cover this somewhere else. We’re going to be tested on it’, it’s part of our knowledge. [INT-Susie-300408]

Implicit in Susie’s explanation here is an underlying suggestion that learning and teaching is bound up in information transmission, regardless of whether it is delivered on the pieces of paper or on the computer, and tests as ways of assessing knowledge retained by the students. ICT to her is a device for facilitating this type of learning and teaching through being more engaging for her students.

Lisa took the idea of engagement through the integration of ICT further. Rather than use ICT to replace an existing, largely teacher-centred approach, Lisa believed firmly in the benefit of the students using ICT to create understanding, believing that in getting the students to use ICT to create things (ads, presentations, and so on) their learning and understanding is much deeper than “writing stuff off the board” [INT-Lisa-170308].

Louise was sceptical about the role of ICT in learning and teaching:

If someone could show me how to use the computers well and the benefit of doing that, how that’s better than doing it another way, then I would really go out of my way to make sure I did that. But I don’t connect the dots there, I’m not sure they’re there; I’m not seeing how it works. [INT-Louise-130308]

She commented that she made very little use of ICT in her own Maths classrooms:

How do you integrate ICT into Maths?? I don’t know how to use technology in Maths really. It’s [ICT] not on my priority list because there are ways of teaching without it. It’s one of those things that should be important but I don’t make it important. It’s also hard to know how to make Maths more relevant to the lives of the students. [INT-Louise-130308]

Louise does not see a real benefit to the students’ learning from using ICT at this point in her own practice but remains open to the possibility that there are benefits. Louise appears to making a deliberate choice about the integration of technology based on her belief that it adds little value to her students’ learning and is not superior to existing pedagogies for Maths. However, if presented with evidence that supported the idea that integrating ICT would enhance student learning in her method area, Louise would be willing to integrate ICT.

Simon tended to gloss over discussions about technology and its role in the classroom, downplaying the use of ICT in the classroom but highlighting the extent to which he made use of technology outside of the classroom, for administration and communication purposes at school, particularly communicating with parents. But, like Louise, a the beginning of the
study Simon saw limited value of using technology in his subject disciplines:

The kids doing Materials have an expectation they’re going to make stuff and use hammers and do things like that. Not use computers. [INT-Simon-140408]

In summary, the younger three graduate teachers had firm ideas about the important role that ICT needed to play in the classroom, primarily because it was so much a part of the lives of their students and because they believed integrating ICT lead to higher levels of student engagement. Louise and Simon, on the other hand, remained skeptical about the value of using ICT, not yet seeing how it enhanced student learning outcomes in their particular disciplines.

### 6.2.4 Self-efficacy

What these findings suggest is that the graduate teachers in this study were not homogeneous in their pre-disposition to and self-efficacy in using ICT. The skills of the graduate teachers in using ICT varied, although all shared a confidence in their ability to at least ‘muddle through’ to learn new technologies whilst others were highly confident at using a wide range of technology applications and felt similarly confident in learning new applications. For some, the idea of using technology in their teaching was taken as a given, reflecting their beliefs in the importance of connecting to the lives of their students. Technology was seen by the graduate teachers as a significant part of the lives of their students, the *lingua franca* of the students, and therefore essential to include in their pedagogy.

For some of the graduate teachers, however, there was a degree of skepticism about the effect using technology has on student learning outcomes in their discipline areas, and while open to the idea that technology may enhance student learning, were yet to be convinced of its efficacy.

Not all of the graduate teachers in this study were convinced that they knew how to integrate ICT in ways that enhanced student learning or in ways that could transform their pedagogies. Their limited experiences in their pre-service teaching programs, where ICT use was talked about more than it was modeled, coupled with minimal observation of ICT being used whilst on their placement, and where it was, largely as an information transmission device, left most of the participants with a feeling of being underprepared to use ICT themselves.

### 6.3 Influence of the more experienced teachers

In Chapter 5 I reported on the strongly teacher-centred pedagogical practices and the relatively low level of integration of ICT by the more experienced teachers in the community of practice of teachers at RiverValley Heights. This section reports on the relationships
between the graduate teachers and the more experienced teachers as a way of foregrounding the influence the practices of the more experienced teachers had on the graduate teachers.

Simon and Kerrie both completed professional placements at RiverValley Heights before securing a position at the school. Both shared the same mentor who acted both as supervising teacher whilst they completed placements at the school and as their VIT mentor in their first year of teaching. Simon worked closely with his mentor during his first year of teaching and continued to work closely with him in his second year, with both teaching Year 10 Science in 2007 and Year 11 Biology in 2008. Theirs was a close relationship:

I’d go and speak to him on a daily basis about whatever we were doing and we work pretty closely together so we do heaps of sharing. I would go to him every second day and ask ‘what do you think of this? What are you going to do for that? And I went and observed lots of his classes to see how he ran pracs and things like that. Like I’ll probably go into his class after this and have a chat and look at the prac they’ll be doing and that I’ll be doing next week. I can also go down and ask advice from the other lady who teaches the subject. We all share our notes. I look at what notes they’re giving to make sure I’m on track with what they’re doing. [INT-Simon-140408]

Kerrie also relied on teaching materials from this mentor, as well as other more experienced teachers in her staffroom, who provided resources for the new teacher:

They know that there are three of us in this staff room who are not a hundred percent sure about anything because it’s our first year, so they’re just willing to help us with everything. Or sometimes we just sort of mention things and they’ll go, oh well, you know, I’ve this and this and this and this, you can use it. [INT-Kerrie-280408]

Louise had high regard for two of the more experienced teachers, who had assisted and mentored her, officially and unofficially, throughout her first year of teaching. She admitted:

I still definitely go to my formal mentor (ET2) for Maths stuff – she’s a very experienced Maths teacher. But for behaviour management and other stuff I go to (ET1). She’s still my go-to. I always go to her if I have a problem with a class, and ask what could I do? How do I change it? She’s always been my mentor in my mind, not my formal mentor. I probably rely on her. I really look up to her. She’s the ultimate professional so she’s the one I probably look up to and would base myself on. [INT-Louise-130308]

Lisa also received assistance and resources from teachers in her staff room throughout the year, particularly from the other Humanities teachers, who shared their activities and
resources with her when she was floundering with content that was new to her. She was impressed in particular with two of the younger teachers whose “willingness to share their resources as well and to give you ideas is just incredible” [INT-Lisa-271108].

However, she struggled to find inspiration from the more experienced teachers, some of whom she felt had stopped making an effort:

They’re coming to the end of their career, they don’t have to do anything extra, you know, they come in and sit in front of the class and don’t have to prove themselves [INT-Lisa-271108].

Susie also had a mixed view of some of her more experienced colleagues She admitted that, in relation to planning her lessons:

Before I do anything I get as much stuff, resources that other people have, like PowerPoints or activity sheets. But I’ve got different things that other teachers here won’t have done, especially in Chemistry. Sometimes I feel like I’ve got heaps of stuff and help, but I also feel like I am contributing a lot myself. [INT- Susie-300408]

The data suggests that the graduate teachers relied heavily on their more experienced colleagues, especially their mentors, for guidance about teaching and learning ideas and for providing resources, particularly when teaching into a new content area. However, two of the graduate teachers appear to have been more critical and less unquestioningly accepting of the approaches taken by some of their more experienced colleagues.

6.4 Enacted practice

The previous two sections examined what the graduate teachers believed about learning, teaching and the role of ICT within that; in other words, the espoused practices of the graduate teachers. The following section examines the enacted ICT-based pedagogical practices of the graduate teachers who participated in this study. Each of the five graduate teacher’s practices is presented and analysed separately. I start each case by looking at the approaches to learning and teaching taken. I also examine assessment practices, the use of textbooks, how students made use of ICT and their perceptions about the approaches to learning taken in the classroom. Each case finishes with reflections by the teacher on their own teaching and use of ICT. This part of the Chapter concludes with a section that draws out major themes across the five cases.
6.4.1 Simon

Approaches to learning and teaching

Throughout the year Simon relied heavily on the use of ‘notes’ as his key teaching strategy in his senior Biology class. ‘Notes’ at RiverValley Heights High refers to teacher-created summaries of key concepts and information the teaching staff deem it important for the students to learn. The majority of Simon’s Biology classes comprised the ‘showing’ of ‘notes’, the term used to describe PowerPoint mini-lectures prepared by the teacher, based closely on the students’ set text book and supplemented with a teacher’s own resources.

I like it because you can go back and read your notes and improve them, make them more concise, throw in little animations. Instead of having to waste time writing notes on the board you can just put up key points and spend your time discussing them. [INT-Simon-140408]

Simon uploaded the PowerPoint presentations to a shared drive on the school’s computer network that the students could access. In class, students copied the key points from each slide to their own notebooks. Occasionally, the students asked questions for clarification, which Simon duly answered. Students all worked individually on the same learning materials at the same pace.

Once developed, the PowerPoint presentations could be re-used either by other teachers or in the following year, which was important to Simon in that it reduced his future workload, freeing his time for other things. Simon also strongly believed that the use of images in his PowerPoint presentations, even if they were the same as in the students’ textbook, made a difference to the students’ ability to understand the concepts he was trying to convey to them, stating “I can show them other pictures and diagrams or animations of the same things, just delivered in different ways” [INT-Simon-140408].

Notes in Biology were commonly followed by a ‘prac’ or laboratory experiment which Simon either demonstrated, at times using a video microscope to transmit clear images of the experiment, or which the students themselves carried out. All the ‘pracs’ were ‘written up’ by the students in the ‘prac’ book that accompanied their textbook.

Simon’s pedagogical approach in his Year 7 and Year 8 Materials classes was very different to that used in Biology. These classes were dominated by students being engaged in hands-on creation of objects – wooden pencil cases, plastic games, wooden picture frames and the like. Simon’s approach in these classes was to provide whole class instruction, demonstrate a specific technique relevant to the next stage of production, and then assist the students individually as they worked independently to build their object. However, no ICT was used
during these classes.

At the end of the year, in response to an idea from one of the other Biology teachers, Simon set the students the task of teaching each other the final topic for the year. His rationale, as explained to the students, was “you guys have been listening to me deliver my notes in the same way all year so something a little bit different might be a nice change for people” [FN-Simon-131008].

He gave them further instructions:

The easiest way to present is probably PowerPoint but it’s really up to you. If you think handouts is the way to go that’s fine. One group is doing a video but they have reservations. If you think you can get across the information that is important from your section of the chapter it could be much more entertaining. [FN-Simon-131008]

Simon admitted that “I’ve never done this sort of thing before so I’m winging it. If it doesn’t work then I’ll learn something and it doesn’t really matter” [INT-Simon-131008].

Simon’s instructions, which emphasised the use of PowerPoint presentations or information handouts, combined with his own pedagogy during the year, led the majority of students to use PowerPoint as their preferred method of ‘teaching’ their peers. The exception to this was a group who produced a video that comprised each student involved being videoed as they read summaries of their section of the textbook. Simon was disappointed in the final products shown by the students.

Even among the students in Simon’s class, teaching was interpreted as imparting information to be copied, remembered and fed back by students in tests.

Simon’s ePotential survey results summarised his ICT capabilities as ‘emergent’ across all categories, reflecting the unsophisticated ways he layered technology onto existing practices.

Assessment

At the end of each Biology unit Simon set the students a test or quiz. At set times, the students undertook School Assessed Coursework (SAC) which, at RiverValley Heights High, took the form of a short examination of the concepts and ideas that were covered. Lessons devoted to revision were scheduled just prior to each SAC. These lessons commonly took the form of more PowerPoint presentations prepared by Simon in the form of questions with answers.

Simon emphasised the importance placed on exam preparation, with a strong commitment to go through at least two practice exams in the latter part of the year, to thoroughly prepare the students for their end of year exams. He explained that:

The Head of Science is really big on getting kids to think for themselves. We looked
at data last week and the kids were pretty bad at exams. The people in charge of looking at Science stuff feel the students need to improve their exam technique and exam preparation. [INT-Simon-091008]

Simon set assignments for the students in his Materials classes on the more theoretical aspects of the subject, for example on safety in the workshop. These assignments took the form of cardboard posters, written reports or PowerPoint presentations prepared by students in their own time as homework. Apart from PowerPoint presentations, no other use of ICT was made in the Materials classroom.

**Textbook**

In Biology, Simon relied on the textbook to guide the treatment of each topic. But during the year he admitted he “hadn’t noticed” the suggestions in the textbook for integrating ICT. The textbook suggested a range of ICT-based activities that included the use of video microscopes by the teacher, as well as suggestions about students making use of digital cameras, data-loggers and sensors, the Internet for research, spreadsheets for recording results and multimedia presentations. Simon did not pursue any of these suggestions during the year.

**Students**

Simon’s students were critical of the same-ness of his classroom approach, causing Simon to re-think his pedagogical practices for the future. When discussing the results of the annual student survey of teachers Simon commented:

> They said they get a lot of just chalk and talk, like notes, notes, notes, notes. I probably need to give them more investigation work to do on the computer and let them discover stuff for themselves. [INT-Simon-261108]

Students in Simon’s class made very little use of ICT themselves, apart from the peer teaching activity described above. When reflecting on student feedback, Simon admitted that:

> One of the things that came up [in the survey] was that they [students] don’t get to use ICT, and at that point they hadn’t done any stuff on the computers on their own. I need to work on that more next year. [INT-Simon-261108]

**Extras**

Simon would occasionally have to take an extra class to cover another teachers’ absence. In addition Simon frequently took on additional responsibilities, such as coaching some of the inter-school sporting teams, which meant that he was absent from his normal timetables classes when the sport teams were competing. In one week, for example, extra events such as a curriculum day (a student free day when teachers participate in curriculum planning and
professional learning activities), a strike day (industrial action by teachers seeking better pay and conditions), an inter-school football competition and a day of leave to attend a family wedding meant that Simon missed four Biology classes.

**Reflection**

Throughout the year, Simon’s pedagogy in this class remained largely unchanged. On one occasion early in the year, Simon expressed concern to me whether the approach he took was the best way to help his students learn.

> I wonder if it’s better to do ‘notes’ first then the prac for xylem and phloem or the other way around? They don’t always need to know the theory first. They know how to use the microscope so maybe they might learn more for themselves if I do the prac first. [INT-Simon-280408]

He wondered whether it would be more effective if the students undertook the experiment before he delivered the ‘notes’. He was still intending to use his PowerPoint presentations to transmit information but after giving the students the chance to discover ideas and concepts for themselves through experimentation. Despite his concerns, Simon maintained the same approach for the rest of the year.

Simon was comfortable with his teaching formula. He didn’t readily take risks or try new approaches. He explained to me at the end of the year:

> I think in Biology I’m still faking it a little, and I think that’s probably why I’ve stayed in terms of the comfort zone with my delivery of the curriculum, it’s been fairly structured so that I’ve got everything covered. [INT-Simon-261108]

The need to ensure ‘everything is covered’ might explain Simon’s heavy reliance on the textbook to guide his teaching. He felt “this obligation that I need to deliver the textbook to them, which is effectively what felt like I did all year” [INT-Simon-261108].

Another possible explanation for the strong reliance on the textbook was Simon’s limited content knowledge in areas of Biology other than plant biology.

Simon would have liked to see more application of ICT in the Materials class that echoed more closely current approaches in the workplace, but felt:

> If we had more time they [students] could do a whole year of it [Materials] and you could do, like, a term of design stuff and use technology so they could learn to use those drawing programs and use the machinery associated with it. But the way the curriculum is and the amount of time we have down there I don’t really feel that ICT has a huge place. [INT-Simon-261108]
At the end of the year Simon felt he still had much to learn particularly in the Materials discipline. But this was also the discipline in which he felt most comfortable teaching and where he had strong ideas about directions he wanted to take with his pedagogy. Simon was determined to teach the same subjects and year levels in the following year at RiverValley Heights so he could consolidate his knowledge in these disciplines, which would allow him more time to explore alternative pedagogies. For example, in addition to increasing the use of ICT in Materials, he wanted to introduce more problem solving and open ended projects and investigations, rather than the closed, closely prescribed projects currently set for the students. Simon also was still finding juggling the demands of a teaching career with a new family difficult, but saw himself teaching for at least the next ten years.

Summary

The use of PowerPoint and the video microscope, and uploading ‘notes’ to a shared drive was the extent of ICT use in Simon’s Biology classes. ICT for Simon was enacted to make delivering notes more efficient and to convey information more clearly through the use of images. With one notable exception, students in Simon’s classes made minimal use of ICT at school, but were able to choose ICT formats for homework assignments. By the end of the year, Simon saw possibilities for making small changes to his pedagogy, such as providing more opportunities for students to direct their own learning, and more opportunities to incorporate ICT in Materials, although he felt constrained by the design of the current curriculum.

6.4.2 Kerrie and Susie

Kerrie and Susie taught in many of the same subjects and year levels, predominantly Year 10 Science and Year 8 Science. They both taught Maths at Year 8 and Year 10 respectively. In addition, Susie taught Year 11 Chemistry. As teachers new to the school and to the profession, their common teaching load provided an opportunity to collaborate and support each other in the development of curriculum and of their pedagogical practices. Many of their observed lessons were identical, the result of joint planning and development. Indeed, for one class, Year 8 Science, they team-taught. As a result, the pedagogical and ICT practices they each enacted were very similar, hence my treatment of them in the same section.

Approaches to learning and teaching

Both teachers made extensive use of PowerPoint presentations to convey information to their students in their Science and in Susie’s Chemistry classes. Like Simon, PowerPoint presentations were seen as an efficient alternative to writing notes on the whiteboard. Kerrie, who taught three of the Year 10 Science classes, stated:
I’d have to write the notes out three times. What a waste of time. I can get a lot more done by using PowerPoint. [INT-Kerrie-170308]

On some occasions, when Kerrie or Susie hadn’t had the opportunity to develop PowerPoint presentations on the topic being taught, they resorted to writing notes on the board.

Both Kerrie and Susie supplemented their use of PowerPoint with showing brief videos from YouTube, excerpts from DVDs, or linked to relevant websites. Kerrie firmly believed that the visual representation of information in a dynamic form helped the students:

By showing them the animations they kind of got how quickly it happened and what happened really easily as opposed to you just sort of doing it on the board or whatever else. [INT-Kerrie-280408]

Again, as with Simon, the emphasis in Kerrie and Susie’s classes was using ICT to enhance their key pedagogical practice of information transmission, in the form of PowerPoint presentations.

Kerrie and Susie also both provided handouts to their students to supplement their textbook, some paper based and some were made available electronically. Kerrie shared her handouts and PowerPoint presentations on the shared drive for students to access, whilst Susie made it a habit to email her PowerPoint presentations to her students. Later in the year both teachers uploaded their notes to virtual classrooms on the school Portal (the school intranet). Kerrie also experimented with making vodcasts of her PowerPoint presentations available to students via the Portal which she felt the students would find useful for revision. Susie regularly emailed her PowerPoint presentations to her students and later in the year also made handouts and assignment information available to students via the Portal.

As in Simon’s Biology class, Kerrie and Susie included experiments in their lessons, linked to the topic at hand. Whilst mostly the students undertook the experiments themselves, on occasions experiments were demonstrated to the students by the teacher. Because she taught more often in the Science block and could make use of the computers and built-in data projectors in that space, Susie tried to enact the integration of ICT into some of her teaching activities, such as:

- getting students to use Excel to calculate and present results
- construct electronic circuits using Crocodile Physics
- use online activities to learn about physics concepts such as acceleration and Ohms Law
- create a cartoon
Both teachers set Internet research tasks for students in a small number of units as assignments, for example researching a scientist, the digestive system and LEDs.

Kerrie and Susie both also used games in their classes as a teaching strategy, with and without technology – for example Kerrie created a PowerPoint version of a television quiz show on one occasion, used M&Ms as concrete materials in a food web activity. The purpose behind showing the videos and playing games for both teachers was to try to make learning more interesting for the students, and to try to connect school science to the lives of the students. Kerrie showed objects to the class that might prompt her students to connect science to the world around them, for example a prosthetic arm on one occasion and a tarantula (dead, in a box) on another (with the not unexpected screams). Playing games and examining real objects for Kerrie and Susie was important:

They just learn better. Because it’s more applicable to them. They remember it because it’s fun. It’s not just crap you’re telling them, they’re learning it for themselves. [INT-Kerrie-280408]

I find they try harder is it’s a game. [INT-Susie-161008]

Despite their attempts at integrating ICT, both Kerrie and Susie were classed only as emergent in the majority of categories of the ePotential capabilities matrix, reflecting their relatively unsophisticated and teacher-dominated uses of ICT.

Assessment

They both made regular use of quizzes in class and set tests at the end of each unit of work. Kerrie preferred to use PowerPoint to display the quiz questions to her students, and both made extensive use of PowerPoint presentations in revision lessons. Susie’s tests were more paper-based.

However, tests, whilst being the dominant form of assessment, were not the only form of assessment. Kerrie and Susie employed a wider range of assessment strategies and tasks, however these generally involved limited use of ICT. For example, on occasions:

- Kerrie set contributions to the Discussion Forum on the Portal as homework
- Both set research projects that students were able to present in their choice of format, although cardboard posters, PowerPoint presentations and word processed reports were the extent of choices made by the students
- Year 8 students were asked to create a board game for one of their assignments
- Year 10 students were asked to create their own experiment to demonstrate one of
fifty Science topics from which they could choose.

Textbooks

Textbooks guided what both teachers did to a large extent, particularly in Maths. Despite being qualified to teach across all areas of Science, Kerrie had a background in environmental sciences, whilst Susie’s main method was Chemistry. Both felt comfortable in determining what resources and activities to use in the topics within their main method areas, but were less sure of their knowledge of content beyond their main method area. Whilst they could provide each other with guidance in Biology and Chemistry, they both admitted to relying on the textbook in other areas. One of the concerns that Susie expressed was that the year 10 students in Science did not use a textbook, so content choice was entirely up to the teachers, within very broad topic guidelines set out in the curriculum guide prepared by the Head of Science for Years 7-10. That left Susie concerned that “I don’t know what’s important for them to know” [INT-Susie-210508]. For Kerrie, “I was given stuff from the person who took it last semester but I didn’t like it. I’ve spent a lot of time trying to find more interesting activities and games. I just need more time to play” [INT-Kerrie-080908].

This lack of content and pedagogical knowledge extended to Maths, which both Kerrie and Susie also taught, despite not doing a Maths method in their pre-service teacher education programs. For Kerrie, teaching Maths was teaching out-of-field and she had a tendency to “teach Maths in the same way I’ve been taught it. I don’t have that knowledge of Maths to make it more open. Maths is really, well, this is either the answer or it's not.” [INT-Kerrie-280408] Susie admitted that she was “qualified to teach Maths to Year 10 but it’s not my strength. I don’t like teaching it.” [INT-Susie-210508]

Both augmented the textbooks with worksheets and handouts. Susie admits that in her Maths classes she “hardly ever writes on the board because kids are always away, so I do handouts instead. They have a textbook but these [handouts] are better explanations than in the textbook” [INT-Susie-091008].

Students

Susie’s students were able to make more use of ICT in their learning experiences than Kerrie’s largely because of the facilities available to Kerrie and the difficulties of gaining reliable access to the school’s computer labs.

However, even when time in the computer labs was arranged, students would sometimes subvert the planned activities. For example, in one trip to the lab, Kerrie’s Year 10 Science class was asked to begin a research task. From my position in the room, I observed a number of students exploring MySpace sites and other unrelated websites, but they would quickly
switch views to restore relevant websites when Kerrie moved around the room checking on their progress. The layout of the room meant that Kerrie was unable to see all the students’ screens unless she moved around the room [FN-170308].

Students in Kerrie’s and Susie’s class were allowed to listen to music on their iPods during class time, when appropriate. However, some students lost focus when doing so as illustrated in this excerpt from fieldnotes:

Kerrie asked the students to repeat what she had done to check for understanding. ‘I don’t understand,’ yells one of the boys from the back of the class. Kerrie continued. The same student eventually asks another question. ‘Were you listening?’ asked Kerrie. ‘Not really,’ replied the student. ‘Why not?’ asked Kerrie. The student responded, ‘I was listening to music.’ Kerrie then demanded that all ipods be turned off. [FN-280408]

These two examples show that some students would lose focus on their learning task when ICT was integrated.

Students in Susie’s and Kerrie’s classes were able to choose to use ICT formats in some of their assignments. The majority of these were PowerPoint presentations.

Another key feature of Simon, Kerrie and Susie’s teaching was that students mostly worked individually. All of the assignments set by these teachers for the year were individual assignments. With the exception of the practical experiments where students usually worked in small groups, students worked individually during class time and on assignments in Kerrie’s and Susie’s classes.

The students gave Kerrie and Susie strong support for their approaches in the annual student survey, including positive feedback on the extent of Kerrie and Susie’s use of ICT.

**Extras**

Kerrie did not have a full teaching load, so was required to take extra classes when other staff were absent. Like Simon, taking extras for Kerrie meant less time available for preparation. At times this mean that ICT enriched activities Kerrie would have planned did not eventuate. She commented, “I didn’t get around to planning any ICT for this lesson because I was busy taking an extra” [INT-Kerrie- 280408].

**Reflection**

Toward the end of the year Kerrie reflected on what she felt she had learned during her first year of teaching and how her teaching may have changed, saying “I don’t know. I don’t think I’ve changed that much. I think what I did in my round [pre-service practicum] was pretty
much what I’ve done this year and it seems to be working” [INT-Kerrie-131108].

Kerrie’s view was that she was in her comfort zone as a teacher but still learning from her more experienced colleagues. Kerrie, who had been on a one-year contract, was very eager to stay at RiverValley Heights the following year but was concerned that there were no vacancies for graduate teachers in her discipline areas.

Susie was less sure of herself at the end of the year, feeling she still had much to learn about being a teacher and felt she struggled at times to cope with the demands of students, parents and mastering new content. Despite being encouraged to stay on another short-term contract at RiverValley Heights, Susie felt she needed to gain broader experience in a different school the following year. Personal choices about living closer to the centre of the city also influenced Susie’s desire to move on.

However, Kerrie and Susie both felt that they would definitely like to use ICT more extensively. Susie was happy with how she used ICT but wanted her students to be able to use ICT more in her classes. Kerrie also wanted to use ICT more but felt constrained in how she can use ICT at RiverValley Heights, stating “I could do more in the way I use ICT but I can’t use it more because I don’t have the access to it and the students don’t have access to it” [INT-Kerrie-011208].

**Summary**

For the majority of their classes, Kerrie and Susie adopted very similar transmissive pedagogical practices that typified teaching practices at RiverValley Heights. Whilst they both used ICT as much as access and the curriculum and textbook allowed, both enacted a strongly transmissive pedagogy for the majority of their classes, relying on the use of ICT to convey information, and the use of tests to assess student learning. This pedagogical approach was used more when the two teachers were teaching outside their primary field. Both teachers wanted to integrate technology more extensively in their teaching, with a shared desire to have their students make more use of ICT, but felt constrained by lack of access to technology-friendly spaces and equipment. Students gave a stamp of approval to the approaches taken by both Kerrie and Susie in their classes, but at times acted to subvert the ways in which ICT was integrated.

### 6.4.3 Louise

**Approaches to teaching and learning**

For the majority of her Maths classes, Louise adopted a very similar pedagogy to Simon, Kerrie and Susie, in that most of her classes comprised initial whole class instruction and
modeling on the whiteboard of the mathematical concepts and processes that were the focus of learning at the time. Students then typically worked through a set of problems from their textbook. For her senior classes, Louise uploaded the notes and handouts she prepared to the shared drive on the school’s computer network. During each lesson, Louise checked on each student’s progress and provided assistance and encouragement where needed.

Louise occasionally tried more innovative teaching and learning approaches. Following a professional learning activity and subsequent discussions with one of the Learning and Teaching Coaches, Louise decided to introduce a jigsaw activity with her Year 9 maths class. This collaborative learning activity involved her students working in groups to discover one index law, which they in turn taught other students. Students were discovering principles and concepts for themselves, rather than being told them.

Following the lesson Louise reflected:

I like to try ideas and see how they [students] are learning and what they remember. I think it [the jigsaw activity] worked really well, but I can only make a judgement when I see what they’ve learned. I’ll ask the students what they thought of the activity after we do a quick test in class. [INT-Louise-050908]

The results of the follow up test were “good, but not a huge impact”. Feedback from the students was interesting to Louise:

The students who find Maths more difficult liked the opportunity to talk about their work and work with their friends, but the others, the ones who ‘get it’ and don’t need help really hated it. They saw it as wasting their time. One girl said ‘Why can’t teachers just teach and stop trying to make school fun.’ [INT-Louise-050908]

Despite the mixed student review and the test results, Louise thought she would try the activity again, but found it difficult to find topics in Maths where this approach might work. ‘Working’ in this sense meant to Louise that it would both suit the topic and support students’ learning.

In another example, the students to made origami frogs, then ran frog races by getting making their paper frogs ‘jump’. Her rationale for this lesson was that she was promoting problem solving and spatial reasoning skills, but she reflected, “Really it was just fun. It was one of those crazy days. Lots of disruptions and things aren’t as they should be. You need a back-up plan” [INT-Louise-050908].

This is an example of the hot action of teaching and how a teacher needs to respond to the “crazy days” that occur frequently in schools by being able to and willing to deviate from the original plan and replace it with something more appropriate in the circumstances. Louise had
stumbled across the activity whilst looking for “something different.” She wanted to engage the students and make learning more interesting for them, as well as for herself: “Sometimes it gets a bit boring [doing the same thing] and I end up checking my watch” [INT-Louise-050908].

However, Louise pointed out “you can’t do fun activities all the time and build knowledge. I don’t like to do an activity unless I really know and understand it” [INT-Louise-050908].

Louise, to a greater extent than the teachers in this study, was strongly focused on her students’ learning as a guide to her choice of pedagogical approach. Whilst fun was important occasionally to break the monotony of the Maths classroom, any approach she took needed to be proven ways of helping her students learn, hence her concern at measuring, through a test, the outcomes of the collaborative jigsaw activity described above.

Louise’s use of ICT in the classroom was very limited. On one occasion she set up a data projector to show a video of exponential graphs to her senior students. The video lasted three minutes, but was well received by students and was considered helpful by Louise in conveying a difficult concept. A more senior Maths teacher, on whom Louise relied for advice and ideas for teaching Further Maths, had recommended the video to her. Occasionally, Louise would set up her own speakers to play music in the background of her classes. As mentioned earlier, Louise would share her handouts with students via the shared drive. Students in Louise’s classes did not make use of ICT in any way.

Not surprisingly given how little ICT Louise used, her ePotential survey placed her in the ‘foundation’ category of the ICT capabilities continuum.

**Assessment**

When students were working independently Louise would use teacher observation to formatively assess individuals’ progress and level of understanding. At the end of each topic Louise set the students a test to assess their learning. Louise used no other summative assessment strategies.

**Textbooks**

The Head of Maths developed the guide for what topics were to be taught at what level and in what order. As part of the Year 9 Maths team, Louise has adopted the same topics but changed the order in which they were taught, based on her colleagues’ reflections about what worked and had not worked the previous year. The Maths teachers meet occasionally to share ideas and plan, but, as Louise pointed out “basically we just follow the textbook” [INT-Louise-030608].
Louise also supplemented the textbook with handouts she prepared when she felt the textbook was inadequate. These were generally compilations of explanations and examples sourced from other Maths textbooks.

**Students**

Louise received outstandingly positive feedback from her students in the annual student survey of teaching, although it was interesting that they did not mention any need for her to increase her use of ICT in their Maths classes, which was feedback commonly received by other teachers at the school. When discussing this with Louise she hypothesized that “students don’t expect to use ICT in Maths. It’s all about the textbook. That’s what they’re used to” [INT-Louise-281008].

**Reflection**

Louise offered the idea that criticisms often leveled at Maths teachers because of their textbook and teacher-centric approaches have some credence:

> We don’t often try interesting things in Maths, especially at senior levels with kids who are used to working and who like working this way. You explain it and they get it and are quite capable of working on their own mostly. This was never my intention. I do more of this than I ever thought I would as an undergraduate. I always thought I’d take more innovative approaches. [INT-Louise-050908]

During the year Louise felt that she was not providing her Year 12 students with the level of support and teaching required to help them attain high VCE scores in Maths. She lacked confidence in herself:

> I feel like my Y12 have got the short straw. The other Y12 teachers are really experienced but I’m so inexperienced. I don’t know, like all the little tricks to get them through VCE so I get really anxious about them. [INT-Louise-050908]

At the end of the year, Louise’ attitude to ICT had shifted a little from the beliefs she expressed at the beginning of the year:

> I see the value of using ICT. I think it’s a really great tool to be used in the classroom. But I just don’t know where to resource stuff from. I don’t know how to use it effectively because I haven’t really, so I haven’t started developing good practices in ICT because I haven’t really used it. So there’s a lot of stuff I would need to do, so I’m just not really confident. [INT-Louise-271108]

Louise was more positively predisposed to the idea of using ICT but felt that she didn’t really know how to use it in ways that were pedagogically sound and would enhance her students’
By the end of the year Louise still felt she was struggling to juggle the different daily demands on her life as a teacher, but felt comfortable in accepting that she would never get everything under control. She was comfortable in that she was doing what she loved to do, but not afraid to “have a go at something new” [INT-Louise-271108]. She felt she had strategies to deal with whatever was thrown at her in the classroom. She felt “I’m starting to really stand on my own. I see myself as more an equal, that what I have to offer [as a teacher] is valuable” [INT-Louis-271108].

Louise, who had an ongoing position at RiverValley Heights, wanted to keep her existing teaching load and year levels, so that she could take on a leadership position as a Year level coordinator within the School.

Summary

Louise, to a greater extent than the other graduate teachers, closely modeled her pedagogy on that of the more experienced teachers with whom she taught. Louise followed a traditional, textbook centred approach to teaching Maths, making minimal use of ICT. The data suggests that Louise’s decisions to not integrate ICT, or indeed adopt other more innovative teaching approaches, stemmed from her lack of conviction that ICT enhanced the students’ test scores, which she saw as her primary function.

6.4.4 Lisa

Approaches to teaching and learning

Lisa taught in the English and Humanities learning areas. Lisa tried hard wherever possible to integrate ways for her students to use ICT. Some examples of the ways in which Lisa integrated ICT in her classes included students using:

- the interactive whiteboard to annotate emotive and persuasive language in newspaper articles
- the online discussion forum on the Portal to peer assess assignments
- virtual classrooms on the Portal to access information about assignments and homework, and access resources Lisa had used in class
- discussion forums
- digital storytelling to create advertisements as part of a unit on rainforests, and as part of a poetry unit
• online databases as research for an oral presentation that used persuasive language in English

• PowerPoint presentations to enhance oral presentations and recording the presentations to play back to the students as a way of self and peer assessment

• Spreadsheets to record their own water usage as part of a unit on water conservation

One of the things that differentiated Lisa’s integration of ICT to the other teachers in this study was that she frequently asked students to use ICT to create products that demonstrated their understandings, views and ideas about whatever topic was being studied. Lisa herself made limited use of ICT to transmit ideas or information, preferring the students to develop and communicate their own ideas in creative ways using technology as a means of doing so. She would at times make use of videos in the classroom but used these as stimulus resources, rather than instructional resources as Simon, Kerrie and Susie tended to do. Lisa saw ICT as an engagement tool, a way to hook students into learning.

Lisa’s own use of ICT was generally limited to demonstrating ICT-based activities when she felt the students were not familiar with an approach she wanted them to take, for example in using online databases instead of just Google for research, or where she felt they needed to improve their skills, such as generating search strings.

Another characteristic of Lisa’s classes was a high level of class discussion. Lisa frequently asked students to voice their opinions and ideas about the topic being studied and created an atmosphere where students were comfortable to ask and answer questions.

Like the other graduate teachers, Lisa’s students worked individually rather than collaboratively in class and on assignments.

Lisa was categorized as being predominantly ‘innovative’ in the majority of categories in the ePotential survey results but was considered ‘transformative’ in her integration of ICT in teaching and learning.

**Assessment**

Lisa employed a range of assessment strategies with her students. In English these were predominantly assignment-based or performance-based assessments. For example, essays, oral presentations, poetry, online discussions, research assignments, and digital stories. In Humanities Lisa also set research assignments which students could present in different ways, although again cardboard sheets, written reports and PowerPoint presentations dominated how students chose to submit their findings. Many of the assignments were based on open-ended questions that required students to synthesise information and justify their position.
Lisa made significant use of tests in Humanities to assess student knowledge at the end of topics, but not in English.

**Textbook**

Lisa made limited use of the set textbook for English, generally only when events, for example illness and absences on extra-curricular activities, conspired to leave her underprepared with more engaging activities. On these occasions, students would be asked to work independently through set activities in the textbook. In Humanities, Lisa made more use of the textbook to guide class activities. Lisa had studied English methods during her pre-service teaching program at university, but teaching Humanities was out-of-field for Lisa. For example, when starting a new topic on Australian politics with her Year 9 class, Lisa admitted:

> I know so little about politics. I had to ask David [experienced teacher] for ideas about what to do with the class. He gave me this pre-test but I had to get him to give me the answers because I’m not confident that I know them all. Then Kath [experienced teacher] gave me this booklet with ideas but I don’t know when I’ll get time to look at it. I suppose I can just stick to the textbook. [INT-Lisa-160608]

She relied on other Humanities teacher who shared her staffroom for ideas and teaching resources in topics where her own knowledge was limited. However, in other topics she was more confident.

**Students**

One of the things that Lisa struggled with when integrating ICT was getting the students to focus on substantive content, and not on how the product looked, as this excerpt from fieldnotes reveals:

> One of the students asks whether they can use a PowerPoint in their oral presentation. Lisa pauses before answering – ‘Yes you can, but I’m not marking you on the brilliance of your PowerPoint but on your use of persuasive techniques.’ [FN-Lisa-160608]

Some of Lisa’s students acted in other ways that subverted her attempts to integrate ICT as the following two excerpts from fieldnotes illustrate:

> One of the boys is playing Doom off his USB, and three others are watching until I walked past. [FN-Lisa-020608]

> One of the boys prefers to do his project at home using MovieMaker, rather than use Photostory. He sat next to the others talking for the rest of the class. [FN-Lisa-]
The resistance of students to apply themselves to the tasks she set, even when using technology which they liked, led Lisa to remark:

I’d really like to work in a school where there is a strong work ethic. The students here complain about doing homework but they don’t work in class time. They’re really lazy. [INT-Lisa-281008]

During the first part of the year, Lisa’s use of ICT was relatively low. However, in response to annual feedback from students about her teaching, Lisa increased her ICT integration in the second part of the year. Lisa discussed this with me, reflecting “They said I didn’t use enough ICT and so I’ve used heaps of ICT since the survey” [INT-Lisa-160608].

Lisa took this feedback seriously and increased noticeably the extent to which she made use of ICT. At the end of the year she reported that “I surveyed them myself at the end of the year and I got a really good response. I asked if I used enough interactive ICT stuff and they said yes, all the time” [INT-Lisa-271108].

**Extras**

Like Kerrie and Simon, extra classes and activities regularly left Lisa feeling that she ‘lost’ time. In one term Lisa felt that she had ‘lost’ between eight and ten periods of her Year 10 English class as a result of special assemblies, excursions, her going on the Year 9 camp and other ‘interruptions’. Lisa commented:

So for next term for each class I’m going to count up how many periods I’m supposed to have with that class, then deduct six to eight lessons that I know I’ll lose and plan on that basis. I had so many things planned for this term but just didn’t get the time to do them. [INT-Lisa- 1606008]

**Reflection**

By the end of the year, Lisa had also begun to think about other ways of integrating ICT in her own teaching. Lisa had been keen to see more laptops be made available to students in class sets so that she could implement more of her ideas. Lisa was on a short-term contract until the end of 2008, but always planned to use the year to gain experience and VIT registration as a ticket to travelling and teaching overseas. She was adamant that:

I don’t want to become a dinosaur, I don’t want to be one of those people that goes on an excursion and sits there reading the paper and not get involved with the kids because they’re over it, the novelty’s worn off. I don’t want to get to that stage. I’m afraid of going stale, yeah, I’m afraid of thinking ‘oh I’ve done that last year, I’ll just
Lisa was highly motivated to try as many new ideas as she could in her teaching, especially ways of integrating ICT as a means of engaging her students. For example, Lisa was eager to try online collaborative projects involving Skype and blogging between her new classes in the UK and classes at RiverValley Heights.

Summary
Lisa made greater use of ICT in her teaching than any of the graduate teachers, despite her frustration at times that doing so was fraught with difficulties and challenges. Lisa preferred to create opportunities for her students to use ICT as a means of representing their understandings, rather than use ICT as an information transmission vehicle. Lisa resorted to more teacher-centred approaches only when she felt she was teaching outside her areas of content knowledge, which is when she relied more heavily on teaching and learning ideas from her more experienced colleagues. Lisa used a broad range of assessment strategies that included but were not dominated by tests.

6.5 Chapter summary
In summary, the dominant pedagogical approach among the majority of the graduate teachers can be described as highly focused on transmitting knowledge/information to the students, frequently enhanced by some graduate teachers through the use of ICT. In the Science disciplines, taught by three of the graduate teachers in this study, ICT-based presentation of information was used extensively either through PowerPoint presentations that substituted for students copying down written notes on the whiteboard, or through the use of other highly visual digital resources used as instructional devices, to more clearly explain concepts.

Assessment was mostly conducted via summative tests and quizzes. Assignments were also set regularly by most of the teachers but mostly these were closed, seeking facts, rather than open-ended inquiry based tasks. Exceptions to this were the more open-ended investigations set occasionally in Humanities, and the assessment tasks set by Lisa in English. Hands-on activities or laboratory experiments were a common feature of both Materials and Science classes. Students went on occasional excursions.

Textbooks, worksheets and printed resources were the predominant approach in Maths, which followed a general formula of teacher modeling, guided practice followed by independent practice by the students, working through textbooks or worksheets with individual assistance from the teacher. Reliance on textbooks and teaching and learning ideas from their more experienced colleagues was high among most of the graduate teachers.
Many of the graduate teachers in this study were teaching out-of-field. This posed significant challenges for them in terms of preparation time and confidence in teaching subjects that were new to them. In these cases, reliance on ideas from their more experienced colleagues was greater than when teaching within their preferred disciplines.

Students worked predominantly individually on teacher-designed activities and assessment tasks with very little collaborative or cooperative work. Students rarely engaged with people from beyond the school.

Teacher use of ICT was dominant, whereas student use of ICT was confined mostly to research, word processing and presentation software on occasions. Susie’s students occasionally used ICT to assist them in building knowledge, whilst Lisa’s students were provided with a broader range of opportunities to use ICT to represent their understandings and to build knowledge.

Over the year, all the teachers in the study made increased use of the RiverValley Heights intranet, the Portal. At a minimum by the end of the year all were making copies of assignment and homework available to students. Some made printed resources, copies of PowerPoint presentations, vodcasts of PowerPoint presentations and handouts available to students electronically. By the end of the year, Lisa’s and Kerrie’s students contributed to discussion forums on the Portal.

The graduate teachers in this study had varied technological proficiency and used ICT to varying degrees in their personal lives. All believed that the integration of ICT was important, if for no other reasons than it was an integral part of their students’ lives and that students were more engaged when ICT was being used. However, not all shared a sense of self-efficacy in knowing how to integrate ICT in ways that would enhance the learning outcomes of the students. Simon and Louise struggled with how to use ICT more in their discipline areas, although recognised that it was something that they needed to address in their own teaching. Lisa, Kerrie and Susie all wanted to use ICT more, but felt constrained in their ability to do so. Of the five graduate teachers, Lisa was the only one to be classified as demonstrating ‘transformative’ ICT capabilities on the ePotential ICT capabilities continuum.
Chapter 7 - Discussion

7.0 Introduction

This study is concerned with investigating the pedagogical practices adopted by a small group of graduate teachers when introducing ICT in their teaching. The study, set in a context of policy rhetoric about the potential of ICT to transform school education, both in terms of student learning and in relation to the pedagogical practices of teachers, attempts to identify the factors that shaped the ICT-based pedagogical choices of the graduate teachers in the early years of their careers. This Chapter discusses five themes that emerged from the research.

The first of these themes relates to the significant gap that existed between the reality of how integration of ICT was performed by the graduate teachers and the rhetoric contained in recent education policies and also in the expectations implicit in arguments and popular beliefs that young, digitally savvy teachers will integrate ICT to a greater extent and more transformative ways that their more experienced colleagues. Teachers at RiverValley Heights High School used ICT, but infrequently integrated ICT, and even less frequently integrated in ways that were transformational. The Chapter begins with a discussion about the distinction between ICT use, ICT integration and transformation of practices through ICT (7.1).

In investigating the experiences of the five graduate teachers in this study, it is apparent that this is, in part, a study of ‘becoming’. This is the second theme discussed (7.2). The graduate teachers were participating in an iterative process of building a professional identity, of ‘becoming’ a professional, with this process taking place within three entwined domains:

i. The individual, personal domain - where the graduate teachers were trying to reconcile their beliefs, knowledge and skills about learning, teaching and technology garnered from formal and informal education with ways of enacting teaching in practice, rather than in theory (7.2.1).

ii. The community of practice domain - where the graduate teachers were part of a collective of teachers, negotiating their identity as a community member (7.2.3).

iii. The organisational domain – where the graduate teachers were part of the material practices of an organisation (7.2.3).

Section 7.2 discusses the influences on the graduate teachers’ practices that emerged from the wider societal and policy context, their own beliefs and experiences, from working within a community of practice and from material and organisational contexts. The interplay of these elements helped to shape the ways and the extent to which the graduate teachers integrated
ICT into their practice. These factors combined to help shape the emerging identities of the graduate teachers and how they incorporated ICT into their pedagogical practices.

The third theme identified in this Chapter is the tendency for practices in this school to be reproduced rather than transformed (7.2.1), as more experienced teachers within the community of practice resisted developing new pedagogical practices and in doing so, generated power forces that shaped the practices of the new entrants to the profession.

Another theme discussed in this chapter relates to the extent to which agency played a role in the ICT-based pedagogical choices made by the graduate teachers (7.2.2).

The final theme raised in this chapter relates to the materiality of the school setting – the physical spaces, artefacts and organisational structures and localized policies and how the material plays a significant mediating role in pedagogical choices (7.2.3). This section also identifies the important role of school leaders in attempts to translate and enact policy aims around transformative integration of ICT.

In the second part of the chapter (from 7.3) I will outline a model of factors that shape how graduate teachers incorporate ICT into their pedagogical practices. Some models that attempt to explain the relationship between ICT and pedagogy appear to simplify the complexity of factors that act on teachers’ practices, or omit considerations of important factors that influence choices around ICT integration. The model presented highlights the messiness of teaching practices as they are performed, and how a broader range of factors intersect and interact to generate power effects that act on teachers’ dispositions and capacities to integrate ICT.

7.1 ICT use, integration or transformation – gaps between reality and rhetoric

7.1.1 A continuum of ICT Integration

The terms ICT use and ICT integration are frequently used interchangeably in both policies and the literature. But there is an important distinction. When we use something we put it into service, in order to achieve a particular end or purpose. For example, we use a car to move us from our current location to a different location, and we use word processors to make the production of texts more efficient. The term ‘use’ therefore suggests the object being used becomes a tool, a means to achieve a particular objective. In teaching practices, technology ‘use’ carries a connotation of layering of ICT onto existing practices, using technology as a direct substitute for an existing way of enacting that practice. Technology may make that practice more efficient, or it may provide a functional improvement – in other words...
technology is used to enhance current practices (PuenteDuara, 2010). For example, teachers use ICT to communicate with students, parents and each other, to record student attendance and marks, to plan curriculum. In the classroom teachers might use data projectors and PowerPoint or videos to convey information and explain concepts, the Internet to locate information resources or email to supplement or replace an instruction. Technology ‘use’ carries with it the implication of pedagogically unsophisticated ways of applying ICT (Harris et al., 2009) and in ways that are focused strongly on teacher use of ICT rather than students’ use of ICT (Department of Education and Early Childhood Development, 2012). ‘Using’ technology also implies technology as an add-on, something that is used at a convenient stage during a lesson, and perhaps used only occasionally.

Integration of technology, on the other hand, suggests much more than an occasional use of tools to enhance current practices. ICT integration suggests the assimilation of ICT into the daily routines and practices, such that they become an integral part of classroom practice (John & Wheeler, 2008). The term integration further suggests that ICT is connected with the learning objectives, methods of instruction, learning style, pace of learning, assessment and evaluation of learning. In other words, ICT integration suggests the connection between ICT skills, discipline content and pedagogical skills where teachers combine their knowledge of pedagogy, of content and of technology to create something that is greater than the sum of its parts (Mishra & Koehler, 2006). Further, ICT is integrated when it is not just the teacher using ICT, but when the teacher creates opportunities for students to use ICT as an integral part of what they do (Department of Education and Early Childhood Development, 2012).

When applying the distinction between the terms ICT use and ICT integration, we see quite different ways of viewing how ICT is enacted pedagogically.

Recent research suggests that best practice integration of ICT is demonstrated when more socio-constructivist approaches to learning and teaching are adopted (Cook, 2010; Dede, 2008), that is, approaches that are characterised by inquiry or project-based approaches that involved working collaboratively on complex real world problems, that involve people and resources from beyond the physical classroom, where students are more responsible for what and how they learn, and where the teacher provides greater differentiation of tasks and approaches to suit the individual learner’s needs. Current policies relating to the integration of ICT have these approaches at their core.

Ways of teaching that reflect such socio-constructivist epistemologies of learning have been developed over generations of teachers since the early part of the 20th century through the social constructivism theories of Lev Vygotsky (1934), John Dewey’s (1956) views on learning through solving problems that involve exploration and experiences, and ideas around
collaborative and cooperative learning espoused by Johnson (1975) to name but a few. Such approaches to learning and teaching that have participation rather than information acquisition as the pedagogical basis were largely developed in a non-technological era but have been appropriated by proponents of ICT integration as those most likely to be effective partners to ICT. However, they are not inherently new or innovative, although in secondary schools, in particular at RiverValley Heights, they do not seem to be particularly widespread. In one sense, it could be argued that integrating technology with these pedagogies is still layering ICT onto existing pedagogies, albeit different, more student-centred, participative pedagogies.

But current policies also stress the transformative properties of ICT. To transform means to change in form and structure, to metamorphose into a different substance (“Transform”, 2013). Digital technologies are shaping the transformation of a number of professions. Take for example journalism, where digital technologies offer more than simply a new voice or new way to report the events of the world; they offer the ability to build new linkages of institutions, individuals, and machines as distinctions between news and newsmakers, reporters and audience break down (Turner, 2005). Journalism is done differently now to twenty years ago. Similarly, some researchers (Hedberg, 2011; N. Law, 2008) argue that as a result of the strong influence of emerging digital technologies, learning in the 21st century is taking on significantly different characteristics to learning in previous millennia and that we need to re-think learning processes and shift to technology-enablement rather than developing technological skill-sets that mimic traditional teaching processes. For example, Thomas and Brown (2011) see a new culture of learning emerging that is based on informal rather than formalised, teacher-driven learning; on learner-driven inquiry through active play and experimentation; and based on learning in non-hierarchical collectives enabled by new forms of digital technologies. Sugata Mitra (2012) has views of a ‘school in the cloud’ where learner-driven, self-organised learning environments built around learners’ natural curiosity are supported by digital media and online mentors. Thus, for ICT integration to be considered transformative, ICT needs to be used in ways that bring about modification and redefinition of teaching and learning, implying significant new design and new practices that may have previously been inconceivable (Puentudura, 2010) rather than be integrated into current best practices.

But whose practice is taken as the benchmark? What might be transformative for one teacher in one school may be considered practice as usual for another teacher in another school. For some schools, such as RiverValley Heights, socio-constructivist pedagogies may be deemed transformative in that they have not previously been applied systematically across the school and represent a re-design and re-imagining of practices at that school.
Further, current best practices are based on current technologies. The rapid evolution of technology provides a steady stream of new functionality and affordances that create new possibilities for social practices, including teaching. In the process what is considered transformative integration of ICT also evolves as it accommodates the affordances of new technologies.

The ways in which ICT is used by teachers can thus be seen as situated at various points along a continuum of ICT integration, where ‘using’ ICT implies fairly unsophisticated ways to enhance current pedagogical practices, ‘integrating’ ICT suggests a more embedded approach to ICT and where ‘transformation’ signifies a fundamental redesign and redefinition of learning and teaching practices. It needs to be noted that ‘transformation’ is also a shifting landscape as technology continues to evolve. The Victorian Department of Education and Early Childhood Development’s ePotential continuum of teachers’ ICT capabilities (Department of Education and Early Childhood Development, 2009) identifies four stages of ICT integration, from foundation to transformative (see 4.3.1). The SAMR model of ICT integration (Puentedura, 2010) also identifies four similar stages of ICT integration – from direct substitution and augmentation to enhance current practices, to transformation through significant modification and redefinition of practices.

Somekh (2010) also suggests a continuum of developing ICT pedagogical practices where teachers initially explore possibilities, develop initial routines, then develop and locate resources that extend possibilities. The next stage in the continuum, according to Somekh, is sharing of experiences, attempts to expand or try new routines, eventually reaching the stage of ICT integration where new social practices are developed in which ICT is no longer merely an addition to the way things were done before.

What none of these models do, however, is give a clear picture of what transformative ICT integration looks like, other than it is something new and not previously imagined. Further, the policies themselves lack clarity on transformative practice other than it shouldn’t be the simple layering of technology onto traditional teacher-centred pedagogies. We may ask: is the policy aim the introduction of socio-cultural pedagogies that embed the integration of ICT, or does policy expect the sort of transformations being imagined by Mitra (2012) and Thomas and Brown (2011) that fundamentally challenge current conceptions of school? This is unclear. However, what is clear is that individual teachers and schools should move along what I call the ICT integration continuum, using examples of contemporary best practices as a guide but importantly, exploring new practices that may transform what happens in their classrooms. It is in the doing of the practice that it will be transformed.
7.1.2. ICT integration at RiverValley Heights

The perception among school leaders, staff and students at RiverValley Heights High School during this study, was that ICT was not integrated extensively or consistently in the classroom. The Principal felt that for the most part the school “still had a long way to go” in integrating ICT into the curriculum [see 5.3]. Students voiced their desire to see ICT being integrated more in their lessons [see 5.3]. Teachers at RiverValley Heights, including the graduate teachers, incorporated technology in different ways along the continuum of ICT integration. ICT was ‘used’ sometimes by some teachers, but rarely integrated, let alone used to transform teaching practices. Instead, the majority of the teachers at RiverValley Heights used ICT as “electric pencils” (Fluck & Dowden, 2009) that is, they were largely layered onto existing pedagogical practices that were dominated by teacher exposition, information transmission and reliance on textbooks [see 5.3], or “broadcast pedagogies” (Rowan & Bigum, 2008) The nature of ICT integration at RiverValley Heights High School thus reflects the trends illustrated in current research, that is, ICT was largely used to enhance and augment existing teaching practices rather than being an integral part of teaching practice or constituting transformative ways of integrating ICT (Dede, 2008; Fluck, 2010). The patchy nature of ICT integration at RiverValley Heights also closely reflects the findings of studies in USA, UK and Australia that have examined the extent of ICT integration in schools and that consistently report lower than expected levels of ICT integration (M. Cox, 2008; Tondeur et al., 2008).

The graduate teachers in this study also integrated ICT in their teaching practice to varying degrees along the continuum of ICT integration. For the majority of the graduate teachers, ICT was used to enhance existing practices, either directly substituting or augmenting existing practices. For example, Simon, Kerrie and Susie, all of whom taught Science classes, used ICT extensively to facilitate the transmission of information to their students, substituting PowerPoint presentations for writing notes on the board for students to copy or showing DVDs or YouTube videos as an alternative to their own explanation of phenomena [see 6.4]. However, in non-Science classes, these three teachers made very little use of ICT. For example, in his Materials classes, Simon’s preferred pedagogy was hands-on project work, with his students learning by doing rather learning by listening and writing notes. In Simon’s, Kerrie’s and Susie’s teaching, ICT was largely confined to teacher-use rather than student-use. Throughout the year, Kerrie and Susie both used a much wider range of pedagogical practices [see 6.4.2], including experiments, research projects and other assignments in their Science classes but, in Kerrie’s case, did not use or integrate ICT into these classes. Susie occasionally made use of ICT including some activities where the students used ICT, but these were exceptions to her normal practice. Kerrie was comfortable in using ICT as an
information transmission tool, but had not yet integrated ICT into other areas of her teaching practice. With one small exception, Louise did not make use of ICT in her Maths classes at all. Instead, she relied heavily on teacher exposition and textbook exercises when teaching Maths, an approach echoed by Kerrie and Susie in their Maths classes.

In contrast, Lisa incorporated ICT whenever she had the opportunity in both her teaching areas of English and Humanities, going out of her way to secure access to teaching spaces where technology was available [see 6.4.4]. Lisa tried to incorporate ICT in ways that were represented a shift in her pedagogy, rather than enhancing current practices. Lisa tried different ways of integrating ICT that represented a departure from the dominant pedagogies of her more experienced colleagues, moving beyond simple use of ICT to explore new routines (Somekh, 2010). Lisa tried more participative approaches when integrating ICT and her classes were characterised by a far greater use of ICT by the students. This was a significant contrast to her fellow graduate teachers, who relied heavily in teacher exposition and provided few opportunities for their students to make use of ICT themselves.

Despite Lisa’s progress in attempting ICT integration, there were some characteristics of best practice ICT integration that were not displayed by any of the graduate teachers. For example, cooperative or collaborative learning was rarely used, with the exception of laboratory experiments and Louise’s experiments with the jigsaw technique in a single Maths lesson [see 6.4.3]. None of the graduate teachers used inquiry or problem-based learning approaches. Research projects, when used, were highly prescribed by the teachers rather than result from student questions and design. Further, learning activities were largely undifferentiated with all students working on the same activity at the same pace. None of the graduate teachers made use of ICT to ‘extend the boundaries of the classroom’ by bringing in people from outside the school. In other words, the ways in which the majority of the graduate teachers integrated ICT was largely layered onto existing pedagogies that were dominated by information transmission approaches rather than the more socio-constructivist approaches to learning and teaching that are held up as the types of pedagogical practices the research into ICT integration, and the current policies, suggest leads to more effective ICT integration (M. Cox & Webb, 2004; Kozma, 2003). None of the graduate teachers used ICT in ways that allowed for task re-design or redefinition, two hallmark characteristics of transformative integration of ICT.

The picture painted by this study shows a substantial gap between the policy rhetoric of ICT as transformative and the reality of how ICT was enacted at the school during this study. ICT was used more often by the graduate teachers than many of their more experienced colleagues, but still at a relatively unsophisticated level. ICT was rarely integrated, in the
sense of being an integral and embedded part of teaching practices, and the nature of such integration fell far short of notions of integrating ICT in ways that allow for a fundamental redefinition of learning and teaching.

However, it seems unrealistic to expect schools or individual teachers to make a significant leap from a relatively low starting position on the ICT integration continuum, where most of the teachers at RiverValley Heights were positioned, to the high end of the ICT integration continuum. Individual teachers and schools may need to start with smaller steps and expectations about what is considered transformative. Further, what may be considered transformative at RiverValley Heights may be considered practice as usual at a school that is starting from a position further along the ICT continuum. I claim that Lisa moved along the ICT continuum towards transformative ICT practices and that her integration of ICT resulted in a re-design of her practices. At the unit of analysis of the individual teacher, there was a transformation of practice.

It is important when considering issues of ICT integration that the contextual factors that teachers, including the graduate teachers, face in the day-to-day life of a school are considered, and it is to these factors that I now turn.

### 7.2 A process of becoming

The primary aim of this study is to understand what factors were at play that influenced the pedagogical choices made by the graduate teachers when integrating ICT that resulted in this patchy and unexceptional picture of ICT integration. But what also became apparent during the study was that the graduate teachers were not at a fixed or stable point in their relationship with ICT or indeed with their pedagogical practices. Instead, the graduate teachers were in the process of becoming a teacher [Chapter 2.4], and in doing so were changing, evolving, developing their identities as teachers, their ways of being in the world of teaching at RiverValley Heights, and their ways of being in a world of teaching where expectations around technology were more visible and significant. The varied ways in which each graduate teacher integrated or did not integrate ICT suggest that they were becoming at different rates and along different, but non-linear trajectories.

This study identifies three broad sets of factors or domains that acted on this process of becoming, and that shaped the ways in which ICT was used by the graduate teachers – the personal or individual domain, the community of practice domain and the socio-material organisational domain. The following sections discuss these three domains in turn although whilst these sections are dealt with as discrete sets of influences, it is important to note that all of these factors intermingled, in somewhat messy ways.
7.2.1 Becoming – as an individual

A range of factors that operate at the individual level is thought to significantly influence the extent to which and the nature of a teacher’s ICT integration. Beliefs in one’s own ability to use ICT and beliefs about pedagogy are seen as significant factors in how a teacher makes use of ICT in their practice. Further, prior experiences play an important role in shaping these beliefs. The following section discusses the role that beliefs played in how the graduate teachers integrated, or did not integrate, ICT into their practice.

Beliefs about ICT skills and confidence

Proponents of the digital natives argument (Prensky, 2001) would argue that the current generation of new teachers, having grown up with technology at their fingertips, would be confident and skilled ICT users and therefore would naturally integrate ICT into their professional practices. However, the graduate teachers in this study were not homogenous members of the so-called digital native generation. They each brought varied digital skills and dispositions from their personal lives with them to their new careers in teaching. Lisa, Kerrie and Susie, all in their early to mid-20s, used ICT extensively in their personal lives [see 6.2.1]. Kerrie and Susie in particular both grew up with technology, barely able to recall life without a computer being an integral component. On the other hand, Simon, in his mid-30s, did not share his younger colleagues’ computer experiences whilst growing up, nor was he exposed to technology in his first career. As a result, Simon struggled to keep pace with technological change, although he acknowledged its importance, particularly as a communication tool. Louise, also in her mid-20s, actively eschewed the use of ICT in her personal life unless absolutely necessary, preferring non-technological ways of communicating and interacting with people.

Belief in one’s own ability to use ICT is considered a key determinant of the extent and the ways in which teachers make use of technology in their teaching practices. Teachers who are confident in their abilities to use ICT tend to develop more positive attitudes towards integrating ICT than those who are not as confident (Lee & Tsai, 2010; Yuen & Ma, 2008). Despite the variation in personal use of ICT, all of the graduate teachers but Simon felt highly confident in their ability to use technology. They were not afraid of using technology, confident that they could work out how to use any new form of technology. Lack of skills and confidence in using ICT was therefore a barrier, albeit a small one, for only one of the participants in this study.

The findings of the study suggest that the graduate teachers displayed a level of heterogeneity in their digital skills and dispositions with not all of them assuming the digital native mantle. Factors such as age and associated lack of ICT experiences, in Simon’s case, or deliberate
choices in favour of non-technological ways of operating, in Louise’s case, were at play for some of the study participants. Whilst most were confident and skilled users of technology in their personal practices, not all were able to translate their skills and confidence to their classroom practice to integrate technology to the extent and in the transformative ways that literature around digital natives suggests, reinforcing ideas put forward by Russell et al. (2003) and Lei (2009) that personal efficacy with ICT does not therefore automatically lead to the adoption of transformative or even best practice ICT based pedagogical practices. Not surprisingly a range of other factors were at play to shape the ICT-based pedagogical practices of the graduate teachers. The following section discusses the role of beliefs in shaping how the graduate teachers made use of ICT in their teaching.

**Beliefs about ICT and pedagogy**

The literature also tells us that beliefs about a practice inform attitudes to that practice (Belland, 2009; Ertmer & Ottenbreit-Leftwich, 2010). This is particularly the case in relation to the integration of ICT into teaching where numerous studies highlight the relationship between positive beliefs about technology, pedagogy and the extent of its integration into teaching practice by early career teachers (Albion & Ertmer, 2002; Bai & Ertmer, 2008; Cox, 2008; Lui & Szabo, 2009). Without exception, all the graduate teachers in this study shared strong beliefs about the importance of integrating ICT into their practices, at least at a generic or macro level. Some of the graduate teachers, Susie, Kerrie and Lisa for example, [see 5.2.] believed that society’s use of ICT, including the extensive personal use of ICT by their students, was a significant driver of their own desire to incorporate ICT in their teaching practices. That is, they believed there was a strong expectation from students, parents, the wider community and, indeed, in education policies, that ICT would be somehow integrated into teaching practices. For example, phrases such as “teachers and educators require the pedagogical knowledge, confidence and skills, resources and support to creatively and effectively use online tools and systems to engage students” (Australian Information and Communication Technology in Education Committee, 2009), “unlocking the full potential of ICT” (Government of Victoria, 2008) and “It is important we use ICT in ways that enhance learning outcomes for students” (Dixon, 2011) pepper recent educational policy documents [see 2.2]. The graduate teachers felt these expectations. In Lisa’s words, she felt “it’s the profession that demands it [integration of ICT]. It’s coming from society. I’m pressured to use it because kids, it’s what they relate to” [see 6.2]. Susie echoed Lisa’s sentiments about expectations around integrating ICT saying she “couldn’t not use computers because they are part of what the kids do” [see 6.2]. Such policies and expectations contributed to the macro-level context in which the graduate teachers were situated and, if not always front of mind, were evidently a factor that contributed to the teachers’ beliefs and concepts of what teaching
needed to include.

Lisa, Susie and Kerrie also felt that by integrating ICT they would be tapping into the lives of their students and thereby more able to engage the students in their learning [see 6.2.3]. This is a reflection of their beliefs about the importance of engaging students, of building a rapport with students as an integral part of their pedagogical practices and an associated belief that ICT could play a significant role in achieving this pedagogical aim. Lisa further believed that ICT was more powerful in the hands of her students than in her own, believing that learning was more effective when students used ICT to create things rather than teachers using ICT to “write stuff on the board.” [see 6.2.3]. Lisa’s beliefs reflected a strong preference for pedagogical practices that involved her students taking a more active role in their learning and the associated belief that ICT was a vehicle for facilitating such practices. For these three teachers who were positively disposed towards using ICT in their own teaching, beliefs about the role of ICT and pedagogy appear to have been important positive drivers for their integration of ICT into their teaching practices.

Louise and Simon, in contrast to Lisa, Kerrie and Susie, displayed far greater scepticism about the importance of ICT in learning and teaching. At the beginning of the study, Louise [see 6.2.3] conceded that she would integrate ICT if someone could show her the benefits but was unconvinced of any benefit of integrating ICT, admitting, “I don’t connect the dots there. I’m not sure they’re there.” Louise was particularly unsure of how ICT benefitted teaching in Maths, her main teaching discipline, saying “How do you integrate ICT into Maths?” [see 6.2.3]. When teaching Maths classes, Louise relied on teacher exposition, textbook exercises and tests as her main pedagogy. In Materials, Simon [see 6.4.1] displayed a strong preference for hands-on learning through the construction of objects. His view at the beginning of the study was that his students expected to “make stuff, use hammers…not use computers.” For Louise and Simon, technology was invisible as an effective learning tool within their respective disciplines, and given no prominence in the pedagogy of their disciplines (Selwyn, 1999). Louise and Simon lacked knowledge about how to integrate ICT into their disciplines - in Mishra and Koehler’s (2006) terms, a lack of technological pedagogical knowledge.

Despite their initial scepticism, Louise and Simon came to share the general belief that ICT was increasingly important in education, reflecting the sentiment of macro-level policies and societal contexts. For example, by the end of the study Louise was more positively disposed to using ICT saying “I see the value of using ICT. I think it’s a really great tool” but still confessed to a lack of understanding of “where to resource [ICT] stuff from. I don’t know how to use it effectively” [see 6.4.3]. At the end of the study Simon was reflecting on how he would like to include more computer-aided design into his Materials curriculum [see 6.4.1]
but there was no suggestion that he would adopt other best practice pedagogies such as investigation, communication and collaboration facilitated by ICT. These two graduate teachers struggled to connect generic ideas and expectations about the value of ICT, which they supported, with their beliefs about the value of ICT in their specific disciplines. For them, beliefs about the role of ICT were not well connected to their beliefs and knowledge about pedagogies in their disciplines.

The experiences of Louise and Simon suggest that generic beliefs about the importance of ICT in learning and teaching are unlikely to be a sufficient driver for teachers to incorporate ICT into their teaching practices. All the graduate teachers believed in the importance of integrating ICT at a generic level, but not all of them believed that ICT was relevant in their specific discipline. For Simon and Louise, integrating ICT for them became something that was done in other disciplines, not in the disciplines in which they taught. Positive beliefs about the role that ICT can play in specific disciplines, combined with necessary knowledge about how technology might be integrated within that discipline, is essential for teachers to integrate ICT in their specific disciplines. I will return to a discussion about discipline specific pedagogies in a later section [see 7.2.2].

Folk pedagogies
Beliefs about teaching are held to be well established by the time a person begins their teacher preparation programs (Bai & Ertmer, 2008), based on their personal experience with learning and teaching through, on average in Australia, thirteen years of first-hand experience in classroom settings. Bruner (1996) termed these beliefs about learning and teaching that develop as a result of our own schooling experiences ‘folk pedagogies’. He argues that teachers act on these folk pedagogies and beliefs, rather than their professed beliefs about learning and teaching, such is the strength of the influence of personal experience as children and students. All of the graduate teachers in this study had limited experience of using ICT in their own schooling. Simon, the oldest of the study participants, had no ICT experiences from school upon which to draw, whilst the younger teachers’ experiences of ICT in their own schooling were largely confined to typing up assignments, using the Internet for research and occasionally using visual presentation software, or seeing IT as a specialist study, that is, not integrated at all. Their folk pedagogies around ICT were therefore limited to ICT being used to support more teacher-centred, information transmission practices, or to support more efficient production and presentation of projects.

Based on their own schooling experiences of ICT integration, one could expect the participants to have formed a strong folk pedagogy about how ICT is ‘done’ in teaching and learning – reinforcing ideas about layering ICT onto very traditional and strongly teacher-
centred forms of teaching, or limiting ICT to a support for broadcast pedagogies, individual research and presentation of work. Indeed, for most of the graduate teachers in this study such an expectation holds true. Their own pedagogical practices when using ICT reflected how they used ICT as students. However, this was not the case for all the study participants. For example, Lisa’s personal experience of using ICT in her own schooling, like her beliefs about learning and teaching and the role of ICT, were very similar to most of her peers, yet her choices of incorporating ICT were markedly different from that of her peers in that student use rather than teacher use of ICT dominated her efforts to integrate ICT. This suggests that folk pedagogies, whilst potentially an important influence, are not necessarily a determinant of practice. That is, they may influence the pedagogical practices of a teacher, but they do not necessarily determine such practices and the degree to which practices are influenced by folk pedagogies may vary. Other factors may act as countervailing influences.

**Taught pedagogies**
Research further suggests that beliefs, once established, are difficult to change (Hennessy et al., 2005; Pajares, 1992; Windschitl & Sahl, 2002) and that changes in beliefs tend to follow, rather than precede, changes in behaviour. Changes in belief about pedagogy and about the role of ICT are most strongly influenced by personal success in using ICT, or through vicarious experiences of others’ success (Pajares, 1992). It would follow then, that the folk pedagogies around the use of ICT in learning and teaching developed by graduate teachers during their own schooling could be influenced by further experiences of ICT, for example, in their own tertiary education, or through exposure to propositional knowledge about innovative or transformative ICT-based pedagogical practices in their teacher preparation programs. Further, it could be expected that observation or first-hand experience of ICT integration during teaching practicum placements could also provide opportunities for experiences that might influence or shift beliefs about the role of ICT and associated pedagogies. In other words, folk pedagogies are potentially replaced with or modified by taught pedagogies, that is, the beliefs about pedagogies that teachers develop during their teacher preparation.

However, even during their tertiary studies that prepared them for teaching, the majority of the participants saw very limited integration of ICT. When asked to describe the ways in which ICT was used in their tertiary studies, four of the five graduate teachers described uses of ICT that were similar to those in their own schooling, that is, characterised by an emphasis on seeing ICT used to support the broadcast pedagogies typical of university studies. When asked about their own use of ICT during their teacher preparation and how ICT was used or discussed in their studies Louise’s response was typical – “I used ICT to type up essays and lesson plans… ICT was discussed but never demonstrated” [see 6.2.2]. All study participants
reported extensive exposure to the use of PowerPoint to support lectures, the Internet to find references and word processing to type up assignments [see 6.2.2]. Such use is not seen as transformative, or even innovative, since it essentially uses technology to enhance these current practices, rather than demonstrating how ICT might be a more integral part of teaching practice or offering different or transformative learning experiences that are enabled through technology.

When Louise stated that “ICT was discussed but never demonstrated” she was highlighting the propositional knowledge that was being imparted during her teacher preparation program, that is, abstract knowledge about integrating ICT. Most of the other graduate teachers reported similar experiences. Ideas about the importance of integrating ICT were espoused but not supported with rich examples of how integrating ICT might work in practice. In that sense, the majority of the graduate teachers had very limited explicit professional knowledge – the know how (J. S. Brown & Duguid, 2000) or the techne (Kemmis & Smith, 2008) - of integrating ICT. In such a vacuum of the techne, it would be expected that these teachers would rely on the beliefs generated from their folk pedagogies.

Susie, however, was an exception. During her teacher preparation program she was exposed to numerous examples of how ICT could be integrated into Science, her main discipline, in ways that were more consistent with best practice pedagogies ICT integration. She also was required to take a specific subject about integrating ICT that was not discipline specific. Susie therefore had much greater opportunity to develop the techne of integrating ICT. The pedagogies she was taught offered a different model to her folk pedagogies.

Thus, the majority of participants in this study had very limited models of integrating technology from their own teacher preparation to inform their beliefs about the role that ICT might be able to play in the classroom. For most of the study participants, their taught pedagogies resulting from their university studies aligned closely with their folk pedagogies. That is, the taught pedagogies reinforced the use of ICT to enhance and augment information transmission pedagogies rather than offer insights into best practice integration of ICT or transformation of learning and teaching through ICT.

Practicum placements during pre-service teacher preparation provided another opportunity to develop their emerging beliefs about pedagogies and ICT. Practicum placements represented an opportunity to see or even try new approaches to the integration of ICT that may, or may not, influence beliefs about learning and teaching and about the role that ICT might potentially play (Pierson & Cozart, 2004). When asked to describe how they saw ICT integrated whilst on their placements, the graduate teachers in this study reported varied experiences. For the majority of the graduate teachers, what they saw and experienced
reinforced their own experiences of ICT as students, that is, superficial uses of ICT layered onto existing teaching practices that were dominated by teacher exposition, information transmission, testing and undifferentiated instruction. All the graduate teachers saw PowerPoint presentations replacing writing notes on the board, displays of DVDs to reinforce concepts, the use of the Internet for research purposes and word processing to type up assignments. Kerrie, Louise and Simon all experienced a placement at RiverValley Heights and were exposed to the ways their mentor teachers used ICT, which were dominated by using ICT to enhance information transmission pedagogies. Again, the taught pedagogies resulting from experiences on practicum placements acted to reinforce the folk pedagogies developed during their own schooling. Susie, again, was a key exception to this finding, having had exposure on her placements to a variety of more innovative pedagogical practices that integrated ICT, in ways that were characterised by more cooperative learning approaches centred on inquiry approaches. Lisa also had some opportunity during one placement to experience the integration of ICT, but this was confined to seeing specialist applications being used in the Media discipline, a discipline she was not teaching at the time of this study. Susie and Lisa’s taught pedagogies would be expected to incorporate more innovative and creative uses of ICT than the other graduate teachers.

If beliefs about pedagogy and the role of ICT within pedagogy play a pivotal role in the extent to which and the way in which teachers integrate ICT, it should follow that, since all the teachers in this study professed a belief in the importance and general value of ICT, they should all integrate ICT. Further, Kerrie, Lisa and Susie would be expected to integrate ICT in ways that are student-centred, collaborative and based in more open-ended inquiry, that is, in ways that support their professed beliefs about pedagogy. But this was not the case for all the graduate teachers. The ways Kerrie and Susie in particular integrated ICT did not reflect their professed pedagogical beliefs.

If theories around folk pedagogies, those beliefs about learning and teaching that are developed from personal experiences of schooling, hold true then it would follow that all of the teachers in this study would only make limited use of ICT and in ways that layered technology onto current, largely teacher-centred pedagogical practices, as they had experienced in their own schooling. That is, their beliefs are shaped by their personal experiences and once shaped are unlikely to change. Again, this was not the case for all the graduate teachers in this study. Lisa in particular attempted to create opportunities for her students to make use of ICT to represent their understandings, to be active users of ICT to support their learning, rather than confine their use of ICT to the internet and word processing.
If taught pedagogies, that is the beliefs about learning and teaching developed as a result of learning about teaching during teacher preparation programs, including what was seen and experienced on placement, are an important influence, then it could be expected that the majority of the graduate teachers would emulate the pedagogies learnt during their teacher preparation. Indeed, for Simon, Kerrie and Louise this held true. All three had observed their mentor teachers integrating ICT whilst on practicum, including at RiverValley Heights High School, in ways that were predominantly limited to PowerPoint presentations to convey information to students. Their own minimal integration of ICT strongly reflected their limited experiences in seeing ICT integrated into teaching and learning. Taking this idea further, it could be expected that teachers like Susie would adopt more student-centred ICT-based pedagogies, given that she was exposed to these pedagogies during her teacher preparation. However, that was not the case. Instead, Susie tended to favour the use of ICT to enhance the information transmission aspects of her teaching practices with only occasional instances of student use of ICT.

Graduate teachers may bring with them to teaching provisional or partial beliefs about pedagogies and the role of ICT resulting from their participation in different educational settings, firstly as a school student themselves, then as pre-service teachers. At times, these beliefs and how they are enacted or performed may appear to be inconsistent. For example, Kerrie, the most digitally literate of the group, held very strong beliefs that ICT is important to integrate and that students respond best when student-centred pedagogies are used. However, she did note really integrate ICT, rather she made frequent use of ICT but only in ways that enhanced her ability to impart information to her students, reflecting more closely the pedagogies learnt whilst a pre-service teacher. Susie held similar views to Kerrie’s about the importance of integrating ICT and was exposed to innovative and creative ways of integrating ICT whilst a pre-service teacher, yet also adopted very conservative practices when including ICT in her teaching practice. Lisa held strong beliefs about integrating ICT in ways that were more student-centred, rather than teacher-centred, despite having had limited exposure to these approaches herself during her own schooling or her teacher preparation programs.

Beliefs about pedagogy and about the role that ICT might play in pedagogy may be challenged or reinforced by the pedagogical practices graduate teachers are exposed to during their own schooling and teacher preparation programs. These shifting, evolving beliefs about ICT-based pedagogical practices and the sometimes inconsistent ways they were enacted by the graduate teachers are an illustration of the process of becoming a professional in which the graduate teachers were engaged – the iterative element of identity construction as they problematized their own use of ICT during the early stages of their career. Reconciling these
inconsistent beliefs about teaching with ICT is important work that graduate teachers undertake in the early years of their teaching career as they construct their emerging professional identities. However, this work is performed within specific social and material contexts which can mediate the enactment of pedagogical beliefs. The following section discusses the social context in which the graduate teachers performed their practices.

7.2.2 Becoming – as a member of a community of practice

When someone learns a practice he \[sic\] is initiated into the traditions of a community of practitioners and the practice world they inhabit. He learns their conventions, constraints, languages…their repertoire of exemplars, systematic knowledge and patterns of knowing-in-action” (Schon, 1987, pp36-37)

In communities of practice theory, groups of people who share a common set of problems or passions, such as teachers, also share a repertoire of actions, styles, artefacts, discourses and stories and ultimately share a common sense of identity. Learning a practice involves taking on the conventions and ‘rules’ of that practice. According to Lave and Wenger (1991), newcomers to a community of practice learn that practice at the metaphorical feet of the more established and experienced members of that practice (Lave & Wenger, 1991), gradually taking on the approaches of their more experienced peers. Learning a practice is seen as inseparable from the doing of the practice. It is in the doing or the performing of a practice, alongside more experienced and potentially more capable practitioners, that the practice is learned. Learning how to perform the practice of teaching with ICT at RiverValley Heights, for the graduate teachers who participated in this study, took place within the context of a community of more experienced teachers. Part of the intent of this research was to examine the impact the community of practice of teachers had on the practices of the newly-graduated teachers.

The findings of this study show that the majority of the graduate teachers at RiverValley Heights High replicated the practices of their more experienced peers. For example, Simon’s supervising teacher whilst on professional placement also acted as his mentor in Simon’s first year of teaching and was influential in planning the Biology curriculum delivered by Simon. Simon adopted the same approaches as his mentor - a cycle of information transmission, largely via PowerPoint presentations, followed by practical experiments, revision and quizzes and tests. Kerrie had also had the same teacher act as her mentor during her first year of teaching, and like Simon, emulated his approach to using PowerPoint and other digital resources to supplement or replace more traditional modes of transmitting information. The practice of transmitting information to a largely passive student audience, either by writing notes on whiteboards or via PowerPoint presentations was common amongst the more
experienced teachers at RiverValley Heights.

Louise shared a similar relationship with one of the senior Maths teachers, relying heavily on her for guidance in how to teach her Maths classes, which was largely based on the teacher demonstrating a new concept or algorithm, then students working individually on problems in their textbooks or on teacher-created handouts. Louise occasionally interrupted this routine with a game or more hands-on activity, only very occasionally trying a new pedagogical practice that placed the students at the centre of the learning.

All of these influential senior teachers adopted pedagogical practices that school leaders admitted were dominant across the school, that is, teacher exposition, information transmission, individual and undifferentiated instruction, and assessment practices dominated by tests [see 5.1]. The teachers who acted as mentors to Susie and Louise did not integrate ICT to any significant extent. The teacher who acted as mentor to Simon and Kerrie used ICT only to deliver PowerPoint presentations to his students. The teacher to whom three of the graduate teachers looked to as an exemplar openly eschewed the adoption of more student-centred pedagogies, favoured a reliance on textbooks and preferred a traditional approach to teaching rather than integrate of ICT [see 5.1]. In other words, the teachers who had the greatest influence on the practices of the graduate teachers were teachers who did not make extensive use of ICT, and who adopted conservative rather than transformational pedagogical practices that centred on the teacher as expert (teacher-centred). Such practices are not consistent with best practice pedagogical practices that make the most of the opportunities offered by ICT, which emphasise a more active role by the student in creating personalised learning rather than passively consuming information.

**Signature Pedagogies**

I claim that the majority of the graduate teachers, along with their more experienced colleagues, adopted the *signature pedagogies* of their respective disciplines. Signature pedagogies (Shulman, 2005) refer to the “types of teaching that organise the fundamental ways in which future practitioners are educated for their new professions” (p. 52). Signature pedagogies are the “modes of teaching and learning that are...replicated in nearly all the institutions that educate in those domains” (p. 54), that is the approaches to teaching and learning that we immediately identify with and intuitively come to expect. Signature pedagogies implicitly define what counts as knowledge in a field and how things become known. Such pedagogies are not always explicit; rather they incorporate the tacit conventions and rules of thumb that have taken hold within the discipline. For example, in the social sciences, particularly history, the mainstream signature pedagogy is one that has revolved around the transmission of historical information and rote memorisation (Beck & Eno, 2012).
In Maths, the traditional signature pedagogy for generations of teachers and their students has been teacher exposition, textbook dependence and testing (Passey, 2012). In science, the mainstream signature pedagogy has revolved around transmission of information about a concept, followed by practical experimentation, writing up the experiment and testing (Hechter, 2012). These would appear to be the pedagogies adopted by the more experienced members of the community of practice of teachers at RiverValley Heights and those that, in turn, have been largely adopted by the graduate teachers.

The role of ICT within the signature pedagogies adopted by teachers at RiverValley Heights was a minor one. The influential, senior teachers who set much of the curriculum and associated teaching practices within their disciplines saw ICT integration as incongruous with the nature and content of their subject (Selwyn, 1999) – “we tried it and it didn’t work”, “the students preferred the traditional way” [see 5.2]. Wenger (1998) argues that if technology is to be used effectively in a learning process, it needs to be transparent. That is, the significance of ICT as a learning tool needs to be highly visible to those who are teaching; they need to clearly see the benefits of technology to students’ learning and to their own teaching. At the same time, the technology cannot be seen to get in the way of learning and teaching, rather it needs to appear seamless (Selwyn, 1999). For many teachers at RiverValley Heights, there was little acceptance of the potential benefits of integrating ICT, resulting in ICT being given no prominence in their discipline-based pedagogical practices.

Further, the more experienced teachers at RiverValley Heights High imbued their graduate teachers with an emphasis on classroom control as the primary goal of the teacher. Throughout discussions with both graduate teachers and their more experienced colleagues phrases such as “I need to know I can control the class before I try anything student-centred” [see 5.1] and “it’s a behaviour issue...you lose control” [see 5.1] were common. This reflects a defensive teaching strategy that places the teacher as the knowledge expert, emphasises knowledge as a transferable commodity rather than a tool to explore and create personal meaning and understanding of the world and emphasises minimising opportunities for student disruption (McNeil, 1986 in Rodriguez, 1992). Louise, in particular among the graduate teachers, conformed to this view, illustrated by her reluctance to try cooperative approaches or other techniques in the classroom until she had her students “under control” [see 6.4.3].

The adoption of the pedagogical practices of the more experienced members of the community of practice at RiverValley Heights was more pronounced when the graduate teachers were teaching out-of-field, that is, teaching into disciplines they had not studied during their teacher preparation programs. For example, Kerrie had no prior experience in teaching Maths, yet was required to teach Year 8 Maths and admitted to reverting to
“teaching Maths the same way I was taught Maths” [see 6.4.2]. Kerrie’s main disciplines were Biology and Environmental Studies, yet she also was required to teach Chemistry, Geology and Physics to her Science classes. Lisa had no formal preparation to teach Humanities yet was required to teach Year 9 Humanities [see 6.4.4]. In both cases, these two teachers relied even more heavily on advice and teaching resources provided by their more experienced colleagues, using approaches that had already been developed rather than having to develop their own resources and learning activities in content areas with which they were unfamiliar. At times, particularly for Lisa, this meant adopting pedagogical practices that were at odds with her preferred practices.

I argued in the introduction to this chapter that the graduate teachers were engaged in a process of becoming and identity formation, and later suggested that their beliefs about ICT and pedagogy were provisional. In a sense, their identities as teachers who use ICT were also provisional, not yet fully elaborated. As newcomers to a profession adjust to their professional roles they engage in ‘role prototyping’ (Ibarra, 1999), observing role models and learning the tactic rules and ways of being in the profession as part of the process of socialisation. They experiment with and adopt provisional selves based on the role models around them as part of the process of becoming an accepted member of that community (Scanlon, 2011). I contend that, as a result of observing how their mentor teachers taught and by using resources, lesson plans and learning activities developed by their more experienced colleagues, the newcomers imitated the pedagogical approaches favoured by the more experienced and influential members of the community of practice of teachers at RiverValley Heights High School. They ‘picked up’ or learned the commonly accepted conventions around teaching that were enacted at RiverValley Heights. That is, they came to understand how to adhere to the ethos, or the ‘rules’ about how teaching was performed by the experienced teachers at the school. At RiverValley Heights, the ‘rules’ about teaching reflected a strong focus on information transmission and teacher as expert. The fact that this practice was dominant in so many areas of the school suggests that this type of teaching practice was what was most highly valued by the teachers in the school. The new teachers were thus socialised into existing, entrenched teaching practices, the traditional signature pedagogies, which layered the use of ICT onto conservative and traditional approaches to teaching, rather than integrating ICT or transforming practice.

A key characteristic of signature pedagogies is that they routinise significant components of pedagogy (Shulman, 2005). As discussed in Chapter 2 [see 2.4] teaching is complex and challenging and at times overwhelming, especially for new entrants to the profession. Adopting signature pedagogies simplifies the challenge of teaching since once they are learned and internalised, they don’t need to be thought about, they become habitual, tacit.
practices.

However, as Shulman (2005) points out “habits are both marvellous scaffolds for complex behaviours as well as dangerous sources of rigidity and preservation” (p. 56). The pedagogical practices at RiverValley Heights displayed, to a large extent, a standardisation of approach and a uniformity of thought (Britzman, 2003) within each discipline and across the school. Conformity in this case brought about an emphasis on reproduction of practice rather than any transformation of that practice. As Britzman (2003) argues:

Conformity is more than uniformity of thought and standardisation of activity. Conformity diminishes prospects of becoming something other than what has previously been established. In this sense, the forces of conformity are repressive...Conformity privileges routinised behaviour over critical action. Its centripetal force pulls toward reproducing the status quo as it mediates our subjective capacity to intervene in the world (p. 46)

The perception of school leaders at RiverValley Heights was that ‘the culture of the school doesn’t change’ [see 5.3] and that ‘teachers [at the school] tend to be fairly conservative and think there is nothing wrong with what they are doing’ [see 5.3] This was reinforced by comments from teachers such as ‘we’ve tried that before, it didn’t work, we’re not trying that again’ (see 5.3) and was reflected in the struggles experienced by the learning and teaching coaches who felt strong resistance from staff to trying new things, such as integrate ICT or work on integrated curriculum projects - ‘I almost beg them to try something new’ [see 5.3]

There was a culture of maintaining the status quo, of doing what had traditionally been done, rather than a culture of embracing new ideas, of experimenting with new practices. In a sense, the pedagogical practices of the experienced teachers at RiverValley Heights could be seen as extremely durable, or even sedimented (Youdell, 2010). Attempts to introduce new ideas, for example the integrated curriculum initiative or the integration of ICT by the learning and teaching coaches, were strongly resisted by the teachers. There was a sense of defensiveness and a culture of conformity about pedagogical practices, rather than a culture of continuous critical reflection by the teachers. ICT was seen as a threat to the existing hegemony of broadcast pedagogies (Rowan & Bigum, 2003) and discrete subject cultures (Fluck, 2009). I argue that there was in fact a counter-discourse to technology integration among some of the more experienced teachers, that is, through their resistance, they challenged the generally accepted benefits of technology integration and pedagogical change.

**Reproduction rather than transformation**

In theory, a practice and knowledge about a practice are fluid, as conflicts and tensions between members of a community of practice are negotiated (Fenwick, 2006). Learning a
practice is not intended to be a simple process of direct transfer of existing styles or total assimilation, but one where current approaches might be changed. Lave and Wenger (1991) argue that newcomers may displace current practices as they move from the periphery towards the centre of a practice. One might therefore expect newcomers to teaching to bring with them new ideas about teaching with ICT, drawing on ideas they have been exposed to during their teacher preparation programs and as a result of their experience with technology. Indeed, that is the thinking that underpins the claims by proponents of the digital natives argument that teaching will be transformed as more people who were born in to the digital era enter the teaching profession and bring with them their digital skills. However, the majority of the graduate teachers in this study perpetuated existing, conservative pedagogical practices that made minimal use of ICT, maintaining the status quo rather than challenging entrenched ways of teaching. If the graduate teachers brought new ideas about ICT integration with them, these ideas were not made evident in how the majority of the graduate teachers performed their practice. Those graduate teachers who had the types of digital skills and predispositions frequently associated with ‘digital natives’ integrated ICT to a minimal extent, and such use as they did make of ICT reinforced and reproduced existing, traditional signature pedagogies rather than acting to transform them.

This finding, on the surface at least, could be seen as supporting one of the major criticisms of communities of practice theory - that learning within a community of practice is more aligned with reproduction of existing practices, the maintenance of the status quo, rather than with the transformation of practices (Fuller, 2007; Hughes et al., 2007; Somekh, 2010; Mulcahy, 2011). However, an alternative view and one that I put forward, is that, in this study, the limitations lie with the inherently rigid characteristics of the community of practice in question, rather than with the theory.

In a community of practice model, newcomers are guided by their more experienced colleagues, in something akin to a master-apprenticeship model. Where the members of the community share a common purpose and goal, learning how to enact that practice becomes a process of imitation and adoption in the early stages of learning a practice.

However, the majority of the more experienced teachers who worked in positions of influence with the graduate teachers did not have the necessary knowledge, skills or predispositions to integrate ICT with best practice pedagogies. Very few of the more experienced teachers made use of ICT at all, and those who did used ICT in relatively unsophisticated ways that reified their current pedagogical practices. The more experienced members of the community were content to stay within their pedagogical comfort zone, rather than committing to a process of continual improvement or of experimentation with new pedagogical practices, including those
that integrated ICT. Few of the experienced teachers that the graduate teachers taught with were therefore in a position to provide guidance around ICT integration to the graduate teachers, as you would expect more experienced practitioners to do in a community of practice. In essence, there were no competent ‘masters’ in positions of influence over the graduate teachers who could guide the graduate teachers’ ICT integration.

Wenger argues that “Communities of practice develop around things that matter to people. As a result, their practices reflect the members’ own understanding of what is important.” (Wenger, 1998, p. 2). This study shows that ICT integration did not matter to the majority of the experienced teachers at RiverValley Heights High School. It was not seen as important to them, even if it was important to the school leaders. I therefore argue that there was not a community of practice that shared the common purpose and goal of integrating ICT into teaching. Instead, there was a community of practice of teachers who shared a goal of maintaining the pedagogical status quo, and that was not interested in change through ICT integration.

Further, the community of practice of teachers at RiverValley Heights, at the time of this study, was inward-looking and highly resistant to change to their pedagogical practices of any sort, including integrating ICT. In a community of practice that displays such inward-looking characteristics, it should not be unexpected that new entrants reproduce current practices. I believe this speaks more about the characteristics of a particular community of practice than it does about the communities of practice model per se. Indeed, Wenger (1998a) claims that “communities can become liabilities if their own expertise becomes insular.” (p. 6). What it does suggest is that transformation of practice - which in essence is what recent education policies are calling for, using ICT as the catalyst – within a community that is insular and resistant to change and where practices are stable to the point of being solidified, is likely to be unsuccessful, regardless of the capabilities of new entrants. Where there are no ‘masters’ to guide the development of the practice, practices are recursive and stable rather than driven by change or transformation.

**Power, identity and agency**

The pressure to conform to the existing pedagogical practices at RiverValley Heights, to ‘fit in’, may have been one significant factor in how some of the graduate teachers chose to perform their teaching. That pressure was not overt on the part of the more experienced teachers, but a tacit pressure to fit in. No one experienced teacher said ‘you must do as I do’. Yet, as in any community, there is a pressure to feel a sense of belonging to that community, to establish an identity as part of that community. The digital native argument of educational transformation relies on the idea that newcomers, the digital natives, will be more progressive
than their experienced colleagues, more likely to disrupt conventional ways of being within that community, bring a different way of understanding and performing teaching with ICT. However, this argument ignores the strong desire of newcomers to a community of practice to feel part of that community, and to feel accepted as part of the community. To do this, newcomers must be recognised as competent in the ways of the community. They become part of the community by being able to play a part in the “relations of engagement that constitute their community” (Wenger, 1998, p.152). In other words, the new entrants establish their credentials with the more experienced members of that community through aligning their practices with the dominant practices of the community, that is, the practices that count. At RiverValley Heights, the pedagogical practices that ‘counted’ were transmissive pedagogies. In replicating the current pedagogical practices modelled by their more experienced colleagues, the graduate teachers were aligning with the culture of the community of practice in which they were situated, developing a sense of credibility with their colleagues, belonging and identity as fully-fledged members of that community. This is, perhaps, not surprising, given the inexperience of the graduate teachers and the out-of-field teaching they were expected to undertake. But the process of aligning practices by the graduate teachers highlights the power relations that are generated and that circulate within a practice and act to reproduce that practice.

In taking on the practices of their more experienced peers, some of the graduate teachers at RiverValley Heights were colonised (Gee, 2000), that is, they accepted the dominant cultural model at RiverValley Heights even though it may have been in conflict with their personal models of more progressive and technologically-enriched schooling. Adaptation of that practice, that is, the introduction of new ways of performing that practice, might only be expected to emerge as the newcomer takes on the confidence and mantle of a fully-fledged practitioner. At this point a stronger sense of identity exists and brings with it the confidence to introduce changes to practice, that is, to exercise agency. I now turn to a discussion of agency in the context of this study.

Novice teachers are frequently positioned as being powerless, having to follow the dominant school culture (Britzman, 2003) or as being particularly vulnerable to the pressures of the school culture they enter (Ertmer & Ottenbreit-Leftwich, 2010). Such arguments are based on Foucauldian notions of power as a disciplinary force, circulating in the everyday practices and processes of institutions and communities (Youdell, 2010). The constant workings of these invisible powers act to normalise those who are subject to it, such as the graduate teachers. A disciplinary view of power suggests an inevitability of practices being self-regulated and maintaining a social order (Usher & Edwards, 2007), that is, reproduction of existing
practices. However, individuals may be regulated by disciplinary power but not determined by it. Individuals, including graduate teachers are able to exert agency, that is, control over their behaviour, to act purposively and reflectively (Moore, 2008), which all humans have except in the most punitive of conditions.

Whilst Gee’s notion of colonisation may have been the outcome for four of the graduate teachers in this study, it should not be assumed that this was done by blind acceptance and compliance on the part of the graduate teachers. All five of the graduate teachers demonstrated the exercise of agency in their pedagogical practices. Louise, for example, made deliberate and deeply considered decisions to not use or integrate ICT into her Maths teaching, as did Simon in his Materials teaching. Kerrie and Susie were both on short-term employment contracts that expired at the end of the year. Both had expressed a desire to stay at the school. To do this they both needed to apply for any vacant position. Kerrie and Susie may therefore have been acting strategically (and pragmatically), to maximise their chance of re-employment by complying with the preferred pedagogical practices of their more senior colleagues who would be influencing the decision about contract extensions. As discussed earlier in this Chapter, Lisa’s practices deviated the most from those adopted by the majority of the more experienced teachers, illustrating her different choices in how to enact ICT integration.

This study so far shows three categories of newcomers to the community of practice at RiverValley Heights emerged during the study. Each category exerted their agency, albeit with different outcomes:

- Deliberate adopters – those graduate teachers who chose to adopt the dominant, largely ICT-free pedagogical practices of the community, believing that such pedagogies best served the interests of the students.
- Reluctant adherers – those graduate teachers who adopted the dominant pedagogical practices of the community, either because of a lack of access to technology enriched spaces or because of a desire to be seen to be compliant with the dominant practices in order to maximise their chance of continued employment at the school
- Intentional resisters – those graduate teachers who made considered choices to resist the dominant pedagogical practices and to substitute transmissive pedagogies with more student-centred pedagogies and more integrated use of ICT.

As discussed earlier, Wenger (1998) asserts that by participating in a community of practice, a teacher’s identity is subject to the influences of the community (Beauchamp and Thomas, 2009). A comparison of Louise, Kerrie and Lisa illustrates how within the same community...
of practice, new entrants can build quite different identities, some that become a reflection of the current practices, and some that take a very different direction from that of the community of practice.

Louise’s identity as a teacher was bound up in how well her students did in their VCE and test scores. Her overriding role was to guide her students to success in their examinations, reflecting the culture of high stakes assessment that pervades secondary schools in Australia and elsewhere (Selwyn, 1999). With this responsibility came a sense of caution, and a preference for staying with tried and true practices that had demonstrated success as measured by student test results. Louise wanted to be convinced that integrating ICT would not threaten the quality of her students’ results, and wanted to be shown how ICT could be integrated into her teaching discipline. Louise also saw herself as a future leader at RiverValley Heights, and modelled herself on those of her colleagues who held leadership positions and who would be influential in determining which staff would take on further leadership roles. Louise took on the role of a deliberate adopter of the practices of her more experienced colleagues.

Kerrie clearly identified as a high-end technology user in her personal life. However, she made limited use of ICT within her own teaching. Of all the graduate teachers, Kerrie was the most keen to continue teaching at RiverValley Heights. She would have liked to incorporate ICT to a greater degree than she did, and in different ways. But Kerrie chose not to challenge the practices at the school that limited her capacity to use and integrate ICT in order to maximise her chance of being re-employed at the end of her contract. Kerrie was also constrained in her capacity to integrate ICT because of the spaces in which she taught. She reluctantly accepted the dominant practices of the community.

In contrast, Lisa had a much different and very clear view of herself as a teacher; a strong sense of identity built in part by what she was clear she did not want to be as a teacher. Lisa, unlike the majority of her graduate teacher peers, was far more critical of the pedagogical practices of some of her more experienced peers and refused to become like them [see 6.4.4]. She saw some of her more experienced colleagues as reluctant to break out of their rigid practices to try new ideas in the classroom. Lisa was adamant that she would not be ‘like them.’ Lisa had a strong sense of identity as a teacher who responds to the needs of her students, exemplified by her willingness to integrate more ICT in response to student feedback, and a teacher who tapped into the students’ world in order to connect with them and build positive relationships. Lisa saw herself clearly as a teacher who used ICT in ways that would excite and engage her students, and even if she didn’t know how that might look, was prepared to try new ideas and approaches. Lisa, unlike the other graduate teachers, did not see her future as a teacher at RiverValley Heights High School. One outcome of this strong sense
of self as a teacher was as stronger sense of agency or empowerment to move ideas forward (C. Beauchamp & Thomas, 2009) and to resist the dominant pedagogies of her more experienced colleagues. Lisa was not bound to conform to the practices of the community since she did not see herself as an ongoing member of the community of practice at RiverValley Heights. Whether a result of her short term status at RiverValley Heights, or for other reasons, Lisa demonstrated a social-emotional capacity (Law, 2008) to teach in ways she was not taught, and to take risks with her own teaching approaches when integrating ICT, at least in disciplines with which she was most comfortable.

I argue that Lisa intentionally resisted the dominant practices at RiverValley Heights by exploring different ways of integrating ICT and, in doing so, shifted away from the signature pedagogies of her more experienced colleagues, along the continuum of ICT integration towards more transformative ICT integration. Lisa worked within the messiness and complexity of the material and social world of the school to find ways to integrate ICT that worked for her and her students, and in the process developed new knowledge about integrating ICT. In the process of ‘doing’ a practice, in this case in integrating ICT in new ways, Lisa was engaged in transforming her own practice.

Lisa’s strong desire to try new practices that engaged the students in more active learning experiences that integrated ICT enabled her to persist in spite of the existence of many factors that, for others, proved to be impenetrable barriers to their ICT integration. Lisa’s confidence, her willingness to experiment with new practices and new technologies, her aversion to the practices of some of her colleagues and her determination to move away from teacher-centred practices demonstrated a capacity for transformation. She was becoming a different sort of teacher to her more experienced colleagues; she was developing an identity as a teacher who integrated ICT, an identity that differentiated her from those around her. Other graduate teachers, who at least for the foreseeable future, saw their future careers tied to the school or who had less confidence in their own teaching, may have felt a diminished sense of agency, a more limited capacity to resist or subvert the current dominant practices. The other graduate teachers did not display the same transformative capacities as Lisa, or the desire to do so.

I claim there is a fourth category of newcomer, but which was not evident in this study, and that is the newcomer as change agent, or the active transformer. Such a newcomer would go further than intentional resistance to existing practices, but would be more proactive in changing not only their own pedagogical practices in relation to ICT integration, but would also influence other teachers to alter their practices. Indeed, this is the role for graduate teachers implicit in the digital natives argument. However, none of the five graduate teachers in this study took on such a role.
What this study shows is that the community of practice of teachers at RiverValley Heights substantially shaped the graduate teachers’ choices around how ICT might be used or integrated into their pedagogical practices, and that this influence, in most cases, acted to perpetuate rather than transform pedagogical practices at the school. However, what this study also shows is that graduate teachers are not without power in exerting individual agency in adopting the existing practices at the school with respect to ICT integration, or subverting current practices, as Lisa did, and to experiment with ways to integrate ICT into their own teaching practices. In an environment such as existed at RiverValley Heights High with solidified pedagogical practices that seem to act against the integration of ICT, graduate teachers require well-developed transformative capacities to act in ways that deviate from, rather than reproduce, the norm.

7.2.3 Becoming – as part of a socio-material organisation

So far my discussion of factors that shape the pedagogical practices of the graduate teachers in this study has focused on the personal and the social domains, particularly the role of the teacher in changing practices. However, in any discussion of ICT integration it is important to consider not just the teachers but also the systems across a school that influence pedagogical practices (Somekh, 2010). Things also matter in a school and they matter to pedagogy, since material things constantly mediate pedagogy (Fenwick & Edwards, 2010). Policy-making often assumes best possible environments for implementation, that is, schools with ideal spaces, resources, teachers and students, or dematerialise the context in which the policy is being implemented (Ball, Maguire, & Braun, 2012). This study has shown that the material context of a school is an important mediating factor in the ICT integration policy enactment work done in schools.

The third domain in which the process of teacher becoming is set thus centres on the material and organisational world of the school - its physical spaces, its policies and organisational structures, its leadership, its curriculum and the effects generated by the mutual interaction of all these elements of the school. Material contexts are often confined to the physical aspects of a school, its buildings and spaces, its equipment and infrastructure which can, as this study has demonstrated, have a significant impact on how technology was or wasn’t integrated. But materiality, or more specifically the socio-materiality, of the school, also includes the ways that a school is organised, its local policies, the artefacts that embody the histories and practices of the school, that carry with them the key discourses that circulate within a school (Ball, Maguire & Braun, 2012). A school can be seen as an assemblage of diverse elements of texts, bodies, spaces and things (Fenwick & Edwards, 2010). All of the elements that make up the assemblage play a role in shaping how other elements within the assemblage perform.
Built pedagogies
In section 4.1.3 I described the physical spaces of RiverValley Heights and within that, the distribution of ICT-enriched teaching spaces. I argue that the physical spaces of the school acted against the integration of ICT by all teachers at the school, not just the graduate teachers. The ways in which a space is designed shape the learning that happens in that space; it becomes the architectural embodiment of educational philosophies (Chism, 2006). A high proportion of the teaching spaces were small, relocatable classrooms with limited physical space or infrastructure to support the integration of ICT. Further, the configuration of the classrooms left very little scope for alternative pedagogies such as collaborative or inquiry pedagogies. Most classrooms comprised rows of tables facing the front of the room where the teacher’s table was positioned in front of the whiteboard. Such a built environment conveys strong messages about what type of learning might take place in such a space and indeed constrains the type of teaching and learning that can occur (Oblinger, 2005). The design of the teaching and learning spaces, the ‘built pedagogy’ (Chism, 2005) that characterised RiverValley Heights supported and in fact reified the dominant pedagogical practices whereby the teacher was the focal point of the classroom who transferred information and instructions to the relatively passive students (Chism, 2005). The spaces passively discouraged the integration of ICT or more social constructivist pedagogies.

The lack of scope for integrating ICT into the majority of teaching and learning spaces forced teachers at RiverValley Heights to book time in the computer labs; however, there were insufficient computer labs to meet the demand for them. Booking the computer labs became highly competitive and the graduate teachers frequently missed out on a slot in the timetable at times when they wanted their students to use computers [see 4.4]. Lack of access to computing facilities was indeed one of the major reasons Kerrie’s students made limited use of ICT. Kerrie was mostly timetabled into a portable Science lab located at the far end of the school campus, with limited scope for using ICT leading her to reflect:

I could do more in the way I use ICT but I can’t use it more because I don’t have the access to it and the students don’t have access to it. [INT-Kerrie-011208, see 6.4.2]

One of the key features of ICT integration is that it should enable access to information and ICT applications when and where they are needed. ICT integration therefore supports flexibility in teaching and learning. However, this flexibility is taken away when classes with computer access need to be booked ahead. Rather than use ICT in the moment, when it most makes sense, ICT related learning activities were stored up to be implemented only when access was secured. This takes away one of the key benefits of using ICT and makes its use less authentic and more rigid. Teachers tend not to want to have to plan their detailed activities too far ahead. As Lisa pointed out [see 4.1.3] “stuff happens” in the daily life of
schools that interferes with plans - it could be a sports day, an excursion in another subject, or simply that students’ learning doesn’t keep pace with a teacher’s plans, requiring adjustments to be made to lesson plans - the hot action of teaching. Having to book access to a computer lab too far ahead of time is inconsistent with the reality of the hot action of teaching - when judgements need to be made in the moment. Teaching rarely follows a predictable path.

**The little things - local policies and procedures**

Timetabling processes that determined which teachers were allocated to ICT-enriched or ICT-friendly teaching and learning spaces also shaped the extent to which and the nature of ICT use by the teachers at RiverValley Heights. It would seem logical that those teachers with a higher predisposition to using ICT might be timetabled into those spaces that supported ICT integration. However, this seemed not to be a consideration in the timetabling process at RiverValley Heights. Thus, teachers, like Lisa and Kerrie, for example, were timetabled into non ICT-friendly spaces.

The requirement to book computer lab time required teachers to engage with issues around unreliable booking systems and keys. Lisa’s incident with gaining access to one of the computer labs, outlined in section 4.4, is highly illustrative of how the interplay of organisational factors directly shapes the use of ICT by the teachers at the school. Lisa had subverted the booking system process, another school administrative procedure that needed to be negotiated in order to access the computer labs, to gain valuable time in one of the computer labs, however, she did not have a key to the computer lab. The school procedures required teachers to borrow a key from the library staff - the custodians of all ICT related equipment. The consequence of this procedure was adding yet another layer of complexity to the process of using ICT - on top of time negotiating the unreliable booking system, time was needed to be taken to go to the library to collect, then return the key to the computer lab. Whilst a seemingly small thing, the repeated need to negotiate this process added a layer of inconvenience to using the computer labs. A further layer of inconvenience and disruption was added by the need to start each class in their timetabled classroom, which, given the dispersed layout of the school campus, could use up five to ten minutes of each class as teachers moved their students between classrooms and computer labs. The fact that teachers had to relocate their classes to access any form of technology of itself meant that the integration of ICT, that is, ICT as an integral part of the classroom was not achievable for those classes not already timetabled into spaces where technology was available. The timetable, often something that is seen simply as an organisational tool, became an important mediating factor in how ICT integration was performed (Fenwick & Edwards 2010), or not, governing who had access to the scarce technology-enriched learning spaces. The material organisation of teaching spaces, times and places for teaching became important in shaping
the ICT-based pedagogical practices of the graduate teachers.

Two other administrative policies in place at RiverValley Heights came into play when attempting to use or integrate ICT. The school’s policy was that students were given an initial allocation of Internet credits, which, when used up had to be supplemented by additional payments. Students frequently ran out of Internet credits, meaning that planned activities using the Internet were frequently disrupted. When using the computers in the Library, the librarians would not allow students who did not have correctly completed Acceptable Use Policies with them to use the computers.

All these small things added up to irritating inconvenience and disruption and over time, acted as a disincentive to even attempt to use the computer labs. As Lisa pointed out, at times “I just get tired. It gets too hard so I don’t bother” [see 4.1.3]. The need to repeatedly do battle with the systems, the physical spaces and other staff, even if of themselves each battle is a small one, eventually act as a disincentive to the integration of ICT into teachers’ pedagogical practices, even when the teacher holds a strong desire to integrate ICT into their practices.

The physical spaces, the systems and procedures around gaining access to the limited ICT resources within the school strongly shaped the extent to which and the nature of how ICT was integrated by the graduate teachers at RiverValley Heights. Despite Kerrie and Lisa’s strong beliefs in the importance of integrating ICT lack of easy access to ICT-enriched teaching spaces prevented them from integrating ICT to the extent and in ways that they believed were important. Indeed, given that the more experienced teachers shared the same difficulties in accessing ICT resources at the school faced by the graduate teachers, then all members of the community of practice faced strong disincentives or barriers to integrate ICT.

Leadership

I argued earlier in this chapter [see 7.2.2] that a community of practice around ICT integration did not exist at RiverValley Heights High School. I further argued that this was the case simply because ICT integration did not matter to those teachers at the school who were the perceived ‘masters’ at the school. ICT integration was not seen as important to the key members of the community, even though it was a priority to those in leadership positions within the school. This highlights a key issue – that the lived practices, that is, those practices performed by a community of practice, may not be aligned with organisational goals and mandates. A true community of practice is not bound by organisational hierarchies and structures (Wenger, 1998a), but evolves naturally around shared purpose and goals. Communities of practice become self-organising, developing and performing practices that align with their common goal.

Organisations, via their leadership, can play a significant role in aligning policy goals,
organisational goals and community of practice goals. As shown in section 2.2.1, recent education policies clearly articulate the goal of educational transformation through ICT integration. The literature identifies that leadership, especially from the Principal, makes a strong difference to how policy is enacted within a school (Fullan, 2001), including policy around ICT integration (Anderson & Dexter, 2005; Tondeur et al., 2008). School leaders play an important role in interpreting and translating policy or making sense of the policy at the school level, that is positioning new policies within an organisational narrative or vision about how the school works and what it does (Ball, Maguire & Braun, 2012). Dede (1993) identifies good technology leaders in schools as those who can displace cherished misconceptions and “mistaken beliefs” (p. 24) through creating and communicating a compelling alternative to current paradigms and practices. A shared vision for ICT integration that considers multiple stakeholder perspectives (Davies, 2010) and that defines what best practice looks like (Hargreaves, 2003), something that government education policies continually fail to do, is a key factor in the successful integration of ICT (Tondeur et al., 2008). The lack of a clear and shared vision of ICT integration is seen a clear barrier to integrating ICT into learning and teaching (Park & Ertmer, 2008). School leaders therefore have the potential to indirectly shape practices by developing and negotiating goals that are common to the organisation and to the communities of practice that exist within the organisation.

At River Valley Heights, school leaders at the Principal level spoke of a desire to see ICT integrated into classroom practices to a much greater degree, but this was not translated into a vision or eLearning plan that was developed jointly with teaching staff (Davies, 2010) or shared with teaching staff. Plans that addressed ICT at River Valley Heights were couched only in terms of resources and budgets. How ICT might be used for teaching and learning was not part of the discussion around the school generally. As a result, there was no clear vision that might have galvanised a shared understanding amongst the teachers at the school about the role that ICT might play in their pedagogical practices. A key feature of a community of practice is a shared goal and purpose, as well as the ability to “conceive of new developments, explore alternatives and envision possible futures” (Wenger, 1998b, p. 178). The lack of a shared vision for ICT integration into teaching and learning meant that there was no shared goal or purpose around integrating ICT among members of the community of practice at River Valley Heights. A shared vision around ICT integration may have acted as a compelling alternative to current practices and provided teachers with an opportunity to imagine a different future, one where best practice ICT integration was prominent. Current cherished practices were able to flourish in the absence of such an alternative paradigm.

Interpretation and translation of policies is frequently passed down the leadership chain. In secondary schools, as was the case at River Valley Heights, this often occurs through
departmental or discipline lines. In the process, such information or interpretations of policy may get truncated or filtered through embedded values that may be in conflict with the policy (Ball, Maguire & Braun, 2012). At RiverValley Heights, three discipline heads who led the development of curriculum in Maths, Science and Humanities and how it was to be implemented were highly conservative in their pedagogical approaches and were critical of technology integration. Their counter-discourses around technology integration were well aired in staff rooms, discipline meetings and staff meetings. These teachers were also ultimately responsible for the development of discipline-specific curriculum, and which guided the practices of the graduate teachers. Not surprisingly, the curriculum documents contained very limited guidance or opportunities for ICT integration and represented a form of counter politics (Youdell, 2010), a manifestation of resistance by the more experienced senior teachers to changing current pedagogical practices, for example by integrating ICT. Such counter politics generate power effects, as colleagues, particularly new entrants to the profession, are influenced by the proponents of the counter-discourses, especially in situations such as at RiverValley Heights where the official discourse around ICT integration from those in more senior leadership positions was relatively mute.

Another major role for school leadership is in supporting and facilitating the enactment of policy at the school level (Ball, Maguire & Braun, 2012). The literature identifies a range of activities that school leadership should undertake to facilitate and support ICT integration, including:

- provide structures, strategies and resources to support ICT integration (Davies, 2010)
- identify and remove impediments to ICT integration (Dede, 1993)
- identify and support champions of innovation and best practice (Hargreaves, 2003), that is, those thought leaders and experts who devise innovative pedagogical practices that integrate ICT as well as those who advocate ICT integration
- support and provide teacher professional learning (Davies, 2010; Tondeur et al., 2008)
- develop systems for monitoring and evaluating ICT integration (Davies, 2010)
- understand the kinds of interactions between different members of staff that are necessary for generating systems for the integration of ICT (Davies, 2010)
- promote knowledge transfer among teachers, through networking and exchange of best practice within the school and with other schools (Davies, 2010; Hargreaves, 2003).

At RiverValley Heights, those in various leadership positions performed some of these roles, however I believe this study shows that two key roles were underperformed – the
identification and support of ICT champions and the promotion of knowledge transfer around ICT integration among teachers.

Champions are seen as critical to the successful integration of ICT because they can form the core of a new community of practice centred on ICT integration. However, champions also need to be well regarded by members of the community of practice in order to have influence over the community’s practices. They need to be ‘charismatic individuals’ who can overcome resistance that the new innovation can provoke within an organisation (Rogers, 2003). Those teachers who had been the champions or advocates of the ICT integration agenda had left the school just prior to the study [see 4.2]. Appointment of the Learning and Teaching Coaches [see 4.2] was an attempt to fill the gap left by the departed ICT champions, however the coaches met with strong resistance from the teachers, something that none of the interim school leaders were able to address and overcome. Few teachers made use of the skills and expertise available within the coaching team, seeing them as outsiders rather than as members of the community of practice.

ICT professional learning opportunities were provided internally by the Learning and Teaching coaches. These mostly related to skills development in specific ICT applications and tools. Staff members were also supported to attend externally provided professional learning around ICT. Small teams of staff were also supported to explore ICT-related initiatives in small, action-research oriented professional learning teams. However, despite these various small-scale initiatives, the learning that may have been gleaned from such activities was not shared amongst teaching staff. Further, the ethos of the school did not explicitly support and encourage the types of reflective practices that support the transformation of practice. This meant that opportunities to start to build a community of practice around ICT integration through sharing of practices, that is, through knowledge transfer, were not created or fostered by school leadership.

This is an example of how leadership plays a key role in creating a school culture and in fostering conditions necessary for transformation (Fullan, 2001). During this study, those in leadership roles at the school were acting in interim capacities. Trying to create a culture around ICT integration was one of many competing priorities in a year that was characterised by leadership instability, new building programs, new integrated curriculum programs, policy compliance and a school review, all of which are significant agendas in their own right. School change, such as that associated with the integration of ICT, requires its champions, its enthusiasts to advocate for ICT integration in the face of competing policy expectations and counter discourses that may emanate from dominant communities of practice. RiverValley Heights, through a combination of circumstances, did not have such champions who were
accepted by the teaching staff and had a leadership team who were not in a position to establish a shared vision for ICT integration that may have aligned practices with organisational and broader education policies. As a result, the types of conversations around the pedagogical changes that might have been necessary to support ICT integration were largely absent from the school. Instead, the conversations around technology were limited to nuts-and-bolts conversations around acquisition of new ICT resources, compliance with external requirements and counter-discourses around ICT integration.

7.2.4 Summary of discussion

What is clear from this study is that there is a significant gap between the ways in which policies, at national, state and school levels envision ICT and the ways in which ICT integration was enacted in this school ‘in the middle’. I argue that whilst policies aim for a transformation of learning and teaching through ICT integration, the reality is that most teachers make relatively unsophisticated use of ICT, rather than integrate ICT in ways that are transformative. In this school, the signature pedagogies were strongly traditional and transmissive rather than participative and, where it was used, ICT was simply layered onto these pedagogical practices, rather than used in ways considered to be best practice, let alone transformational.

Graduate teachers in the early years of their career are engaged in a process of becoming, influenced by a range of external, individual and socio-material factors. Individually, new entrants to the teaching profession negotiate the tensions that arise from the interplay between their ICT self-efficacy, the folk pedagogies they bring with them as a result of their own education experiences, the taught pedagogies they experience whilst preparing to be a teacher, and the signature pedagogies of their teaching disciplines they encounter from more experienced members of the community of practice in which they are situated. I argue that the community of practice of teachers at the school acted to reinforce and reproduce these traditional pedagogies, and set up a counter-discourse to the current policy discourse around ICT integration, resisting attempts to change their current practices. I further argue that the material world of the school – the physical spaces, that is the built pedagogy, the curriculum artefacts, the organisational structures, and the role of school leaders at the time, also acted to reinforce existing practices. The complex interplay between these three domains – in this school, at this time, and with these teachers – acted in the most part to reinforce existing, conservative pedagogical practices.

It is within this context that new entrants to the teaching profession negotiate their emerging identities as 21st century teachers. In doing so, the graduate teachers in this study made choices about how they enacted their practice. Some intentionally resisted and subverted the
pressures to conform to the dominant practices, some reluctantly conformed to the dominant ethos even when doing so contradicted their personal beliefs about the role that ICT might play in their pedagogical practices, and other deliberately adopted dominant pedagogical practices where such practices aligned with their beliefs about pedagogy. All exerted agency over their pedagogical choices, although with different outcomes.

7.3 Wicked problems and messiness

The preceding discussion of the difficulties encountered by teachers and this school in attempting to integrate ICT brings to mind Rittel & Webber’s (1973) notion of a ‘wicked’ problem, that is, a problem that has incomplete, contradictory and changing requirements. Wicked problems cannot be solved in a linear fashion because of their inherent and complex interdependencies - the solution to one aspect of the problem may reveal or create another even more complex problem. Wicked problems thus reflect the level of entanglement and messiness that arise from complex interdependencies.

The story told in this study of the integration of ICT by the graduate teachers at RiverValley Heights confirms this view of technology integration as a ‘wicked problem’. The experiences of the graduate teachers in this study show that many elements are in play simultaneously when attempting to integrate ICT, and trying to untangle the effects of these elements or influences in a coherent way is difficult.

All teachers at RiverValley Heights were performing their teaching practices in a particular physical, temporal, organisational and political context. The diverse assemblage of actors, human and non-human, forms a complex environment. Within this environment, the teachers, students, spaces, technologies, other policies and priorities constantly merge with one another, intersect and overlap. Attempts to integrate ICT into classrooms also take place within the histories of other policies, subjectivities, different cultures, subject cultures, histories and traditions within the RiverValley Heights community of practice.

Choices about practice, for example the types of pedagogies to enact and the extent to which ICT was integrated, were influenced by this unique context, that is, by the effects that were generated when all of the players in the assemblage that is the school came together. No one teacher at the school enacted their teaching in isolation from one another or from the materiality of the school. The interplay of physical spaces, administrative procedures, timetables and the busy-ness that makes up a teacher’s life all mediate the choices that all teachers, not just the graduate teachers, made about integrating, or not integrating, ICT.

Popular models around ICT integration tend to underplay the complexity of factors that shape ICT integration. Mishra & Koehler (2006) also describe the integration of ICT as a wicked
problem. However, they propose a solution to the wicked problem of ICT integration in the form of TPACK [see 2.4.2] arguing that effective integration of ICT can be achieved when teachers combine their technological knowledge with their content and pedagogical knowledge. This study clearly establishes that teacher knowledge is only one factor contributing to the complexity of integrating ICT. TPACK might offer useful insights into teacher knowledge around technology, pedagogy and content, but this study shows that teacher knowledge alone is not the answer to this particular wicked problem. It ignores the complex and messy context in which ICT integration is so often situated.

I propose an alternative way of conceiving the factors that act in concert to shape the ICT-based pedagogical practices of teachers, including the graduate teachers in this study. The context, the situation in which ICT-based pedagogical practices are performed, brings to bear enormous influences on the extent to which and the ways in which teachers, particularly graduate teachers, are able to perform ICT-based pedagogical practices. I have grouped these contextual factors into three domains - the external environment, individual factors and socio-material factors.

**External environment**

All practices take place within a broad, macro level external environment where factors not immediately part of that practice still have an impact on that practice. Figure 2 identifies a range of factors that operate in the external environment that impact to various extents on school education. They collectively provide the broad, underlying platform on which pedagogical practices are enacted and include:

- **Societal expectations** - society has an expectation that one of the functions of schooling is to prepare students for employment and for productive participation in society. The role of ICT is now an integral part of 21st century society and the workplace. Parents expect schools to offer technologically-enriched learning experiences and access to appropriate technology that will enable their children to gain the necessary skills and know-how to enable them to function effectively and productively in a technologically dominated world.

- **Policy Environment** - societal expectations about the role of technology in education are reflected in broad national and state education policies as well as in school curriculum and resources policies relating to the integration of ICT. The strong emphasis on the transformative potential of ICT is one of a number of policy drivers acting on school leadership teams, who feel the pressure to at least be seen to be keeping pace with ICT integration. However, ICT integration is just one of a broad range of policy imperatives that school leadership teams are faced with at any one time. School leaders
are responsible for translating broad policy agendas into school-based action.

**Figure 2: External factors that shape ICT pedagogical practices**

- **Technological change** - a key feature of technology is that it is constantly changing, and that the pace of change seems to accelerate. New devices and software applications bombard us on a daily basis. This environment of rapid technological change impacts on schools and teachers and their ability to keep pace with technology, to develop and implement new pedagogies that integrate ICT.

- **Emerging pedagogies** - new technologies bring with them opportunities to do things in classrooms that were previously inconceivable, or to do the same things in fundamentally different ways. Best practice use of ICT brings with it opportunities for new pedagogical practices. These emerging pedagogies represent new ways of teaching but may be ill-defined or not fully developed as teachers at the leading edge of ICT integration explore new practices. Emerging pedagogies that integrate ICT might challenge (some) teachers’ conventional pedagogical practices, or at the very least sit in the background as a potential threat to conventional pedagogical practices, or provide opportunities for teachers to take a new approach to pedagogy in their classrooms.

- **Students’ out-of-school technology use** - young people on the whole are highly engaged with technology and make extensive use of technology in their out-of-school lives. They also bring technology with them into schools. Increasingly, as was the case in this study, young people expect to be able to use ICT in school as well. Many teachers acknowledge the need to embrace technology in their own practices if for no other
reasons than the significant role that technology plays in the lives of their students.

- **Teacher performativity** - the school sector in Australia is increasingly being subjected to increased surveillance and accountability (Webb, 2009). Policy discussions are awash with notions of linking school funding and teacher salaries to performance indicators in an attempt to fix perceptions of underperformance against international benchmarks. New policy initiatives are generally accompanied by accountability and compliance requirements that place additional burdens on teachers’ time. Perception of teachers and their role in school performance, as well as their standing in the community can help shape graduate teachers’ emerging sense of identity as teachers.

**Individual factors**

New teachers to the profession bring with them a range of beliefs, attitudes, skills, philosophies and predispositions that they have accumulated on their journey to becoming a teacher. They do not begin their teaching career as blank slates. Figure 3 identifies a range of individual factors that teachers bring with them and which evolve over time to shape their ICT-based pedagogical practices. Individual factors include:

- **Pedagogical beliefs** - teachers, at any stage of their career including at the beginning, hold a set of beliefs about how teaching should be enacted, what is important to them about teaching. Their beliefs are the result of their own experiences as students, what I have referred to, using Bruner’s term, as folk pedagogies, and the explicit ideas about learning and teaching they have developed during their teacher preparation, that is, their taught pedagogies. These pedagogical beliefs may be emergent and ill defined, and have a sense of fluidity as new teachers experiment with new ideas and approaches.

- **ICT skills and knowledge** - graduate teachers bring with them some form of skill and knowledge about ICT and how to use it. These skills may range along a continuum from basic, foundation level skills in how to use ICT in a personal domain, to complex knowledge and understanding of how ICT might be applied in a classroom to foster innovative pedagogical practices. Confidence in their own ability to use ICT plays an important role in shaping their pedagogical practices with respect to ICT.

- **ICT pedagogical beliefs** - teachers also have a view about the role that ICT might play within their own pedagogical practices. Their view about ICT and its congruence with their own pedagogical beliefs will shape how they might plan to use or integrate ICT in their own teaching practices.
**Figure 3: Individual factors that shape ICT pedagogical practices**

- **Content knowledge** - the level of familiarity with the content being taught also shapes practices. When teaching concepts and content that is familiar, the new teacher has more confidence and takes less time to prepare lessons, leaving more time to experiment with new pedagogical practices, including those that might integrate ICT. When teaching out-of-field, that is, in content areas with which the new teacher is less familiar, then more time is needed to grasp the content, rather than focus on the pedagogy used to teach that content. Examples of teaching out-of-field in this study were all characterised by a greater dependence on other teachers for pedagogical guidance.

- **Transformative capacities** – beliefs, knowledge and skills form the *know how* or *techne* of teaching that new entrants to the teaching profession bring with them. However, integrating ICT effectively requires more than positive beliefs about ICT and adequate knowledge about the content and pedagogy required to teach using ICT. A capacity to act in the face of sustained resistance to new pedagogical practices is required to integrate ICT into the classroom. Such a capacity requires a sense of risk-taking on the part of the new teacher, combined with persistence and a willingness to subvert established ways of practising. For graduate teachers to integrate ICT into their pedagogical practice, they require a strong sense of self, a sense of identity and self-belief that can sustain them if their approach goes in directions that is opposite or even tangential to the dominant pedagogical practices within the school. In graduate teachers such a capacity may be latent or tentative as they reconcile tensions that arise from dissonance between beliefs and fitting in to their new community of practice. Nurturing such capacities therefore becomes important work for schools to maximise the emergent
capacity for transformation within graduate teachers.

- **Career aspirations** - the majority of graduate teachers in Victorian schools are employed on short term contracts, often for six months or one year at a time (Australian Education Union, 2007). An initial contract period is often used by a school to ‘test out’ new teachers prior to offering ongoing positions. The overall market for secondary teachers in Victoria is relatively stable or in oversupply in some discipline areas, suggesting that opportunities for securing ongoing positions are limited. The practice of only offering short-term contracts generates strong power effects on the practices of graduate teachers on such employment conditions. Graduate teachers who aspire to continue teaching within a specific school may conform to current practices within a school in order to maximise their re-employment prospects, rather than stand out from the crowd. Graduate teachers who are less disposed to staying in one particular school may be more inclined to follow their own beliefs, even if these clash with or deviate from the norm within their school.

**Interplay between individual factors and external environment**

Models by their very nature simplify what are frequently messy phenomena. Placing borders around ideas and elements in boxes has a tendency to downplay the interactions between these elements and suggest a neatness that may not exist in reality. So far in this model, I have delineated those factors which are in the external domain and those factors which I consider part of the individual domain. However, these factors interact, in somewhat messy ways, and influence each other. Figure 4 illustrates that the factors that individuals bring with them that shape their predispositions to integrating ICT into their pedagogical practices are situated within the broader external environment and that elements of the external environment can act upon the individual factors.

For example, in this study, students’ out of school use of technology acted to shape the beliefs about the importance of ICT in pedagogy held by at least two of the graduate teachers. The rapid pace of technological change can impact on an individual teacher’s ICT skills and knowledge - the faster technology changes the more time teachers need to spend familiarising themselves with new applications and devices and experimenting with new ways of incorporating ICT into their pedagogical practices. Emerging pedagogies may impact on graduate teachers’ existing beliefs about pedagogies and, within those, the role that ICT might play.
The arrows in Figure 4 suggest that the relationship between the external environment and individual factors that affect ICT-based pedagogical practices is not simply a one way relationship, with the external environment acting on a teacher’s individual factors. Rather, I describe a more reflexive relationship with teachers’ beliefs, pedagogies and capacities also potentially acting on elements of the external environment. Emerging pedagogies, for example, are developed by teachers as a result of their experimentation with new technologies and new practices, in turn based on their beliefs about ICT and about pedagogy and the relationship between the two. Exemplary use and integration of ICT by individual teachers that results from their individual technological, pedagogical and content knowledge and beliefs can influence policy directions and initiatives.

**Socio-material factors**

What teachers bring with them to their new profession will have an impact on how they perform the practices of that profession. However, practices are highly localised and the context in which a practice is performed may result in significant gaps between the espoused beliefs about a practice held by a graduate teacher and how they ultimately perform that practice. The wider, macro or external environment is part of that context, but practices are also situated in highly specific socio-material contexts of each particular school.

Figure 5 depicts those factors at the organisation level, which can act to shape the ICT based pedagogical practices of graduate teachers. These factors are a combination of the social but
This study demonstrated that a range of factors act at the school level to shape the ICT-based pedagogical practices of the graduate teachers, including:

- **The more experienced teachers** - the practices of the more experienced teachers within a community of practice in which graduate teachers find themselves can have a most profound influence on how graduate teachers perform their practices. Individual experienced teachers act as mentors, members of discipline-based teaching teams and heads of departments within a secondary school and can be the source of significant explicit guidance on pedagogical practices. Experienced teachers can willingly share lesson plans, tests, activities and pedagogies with their less experienced new colleagues. New teachers can willingly accept these ideas and practices for a variety of reasons - inadequate content knowledge in out-of-field disciplines, inexperience, admiration for the practices of their more experienced colleagues, and a desire to be seen to conform to the practices of the community.

- In addition to the individual experienced teachers, each school has its own ethos, its characteristic way of doing things guided by shared fundamental values. Part of becoming a member of a new community of practice or organisation is taking on the ethos of the community or organisation, that is, adopting the practical skills and wisdom, the phronesis, of the community of practice [see 2.3]. If the ethos of a school is one of conventionalism and traditional ways of teaching, this may act against the integration of ICT. If, on the other hand, the ethos is one of experimentation through
action research and of continual improvement, then this may act to facilitate the integration of ICT.

- **Subject cultures and signature pedagogies** - secondary schools in Australia are generally organised around subjects or disciplines. Each subject area or discipline tends to develop its own ethos, its own way of doing teaching that is influenced by the specific nature of the discipline and of the individuals who teach into that discipline. Subject cultures become communities of practice within the broader school community of practice. Within each subject there is also a signature pedagogy, a way of teaching and learning within that subject that is readily identified that are replicated in the majority of schools. These ways of being a teacher within a discipline exert significant effects on new entrants to a profession. They are experienced as the way to teach the content of that discipline. Traditional signature pedagogies developed in an era that pre-dated the integration of ICT. Where traditional signature pedagogies are dominant, ICT integration may therefore be limited.

- **Curriculum** - each school is responsible for translating national and state curriculum frameworks and standards into school-level curriculum plans. Within the school curriculum, each discipline will develop detailed curriculum plans for implementation by teachers who teach into that discipline. Individual teachers, in turn, translate school and discipline level curriculum into individual unit and lesson plans and learning and teaching activities. There is thus an iterative process of translating curriculum policy from the national level to the classroom level. Along the way, the values and pedagogical practices of those involved in curriculum work are embodied into each level of curriculum. Existing practices are reified into curriculum documents. Some teachers in this policy translation process, usually the more senior and experienced heads of departments, have more influence than others on how the curriculum is shaped with a corresponding tendency for their pedagogical practices to be those that form the basis for school and classroom level curriculum. Teachers with limited experience and understanding of the role ICT might play, or who are not predisposed to using ICT themselves, may not provide scope within the curriculum for ICT integration.

- **Built pedagogy** - the physical spaces in which teaching is conducted will also shape the ICT-based pedagogical practice of teachers. Limited access to reliable technology will limit the frequency and extent to which teachers are able to integrate ICT into their pedagogical practices. Teaching and learning spaces that do not accommodate more flexible and innovative pedagogical approaches may act as a disincentive to adopting best practice or transformative uses of ICT. Traditional classroom design and standard classroom sizes have a tendency to support more traditional, transmissive pedagogies.
Such spaces were never designed to accommodate additional equipment, such as the types of fixed computer technology that was in place at the time of this study. The fixed layout of computer labs, the alternative to classroom-based equipment, can also dictate the type of pedagogical practices that can be implemented in such a space.

- **Leadership** - for many schools, the integration of ICT represents a change process. School leadership teams play a significant role in any change management or school reform process. Leadership can foster the conditions for transformation through engaging teachers in conversations around alternative paradigms for learning and teaching through ICT; in defining and describing best practice ICT integration; in supporting teachers who will effectively champion ICT integration through innovative practices that inspire a shift in beliefs and current practices; and in fostering knowledge transfer among teachers within and beyond the school.

- **Organisation structures** - the processes and structures put in place by school leaders to oversee a reform agenda such as ICT integration will play a significant role in how ICT integration is performed within the school. The delegation of an ICT integration agenda to committees and amongst others with leadership roles can have an important influence on the role of pedagogy in the ICT integration efforts within a school. Committees may place varying degrees of emphasis on the role of pedagogy within their deliberations. Some, like the ICT Committee in this study, may pay more attention to the management of ICT resources rather than to the role of pedagogy in the ICT agenda at a school. Those with leadership responsibilities around ICT implementation may act as champions of ICT or as gatekeepers of ICT, or various points between, with very different effects on how ICT is performed within a school.

- **Local ICT policies** - part of the responsibility of schools is to establish school-specific policies around ICT use and integration. Some of these policies may have unintended effects on the pedagogical practices of teachers who are trying to integrate ICT. Examples in this study included policies such as acceptable use by students and a user pays system for internet access. Consideration of the pedagogical implications of such policies is important in the ICT agenda of any school.

- **Other school priorities** - schools are subject to a seemingly endless stream of policy initiatives and reforms, and expectations about performance. The integration of ICT is just one agenda that most schools are facing. ICT may not be the most prominent agenda. Other priorities may compete for the attention and energies of school leaders and staff.

- **Student behaviours** - teachers may have well-developed plans for innovative ICT-based pedagogical practices, however, students may act to resist or subvert the planned
practices of teachers, either deliberately or accidentally. During this study, I observed students playing computer games and chatting on MySpace during ICT-enriched lessons, rather than paying attention to the planned activities. Many students used their Internet credits on social networking and playing online games rather than ensuring they had sufficient credits for academic purposes, thus subverting plans by teachers to use ICT.

**Interplay between socio-material factors and external environment**

Individual schools do not exist in isolation from the wider world. The socio-material factors that exist within a school and that act on the ICT-based pedagogical practices of teachers also exist within and are shaped by the external environment (Figure 6). For example, the external policy environment has a potentially significant impact on individual schools through resourcing, through curriculum policy and other initiatives, including the ICT policy agenda. Policies related to school and teacher performativity also help to shape the practices within a school. Schools also respond to societal expectations around providing students with appropriate foundational ICT skills and try to meet growing parental expectations that schools will use current technology in their curriculum programs. Such expectations are generally not pedagogically focused, but reflective of more economic imperatives. Students’ own use of ICT outside of school also acts to shape pedagogical practices as teachers respond to the challenges and opportunities new technologies present, and as they attempt to make connections to the lives of their students beyond school. Emerging signature pedagogies that are developing in response to new technologies will impact on the pedagogical practices within individual schools - these will be assimilated or resisted by current teachers.

As with Figure 4, I have used double headed arrows in Figure 6 to illustrate a permeability between socio-material factors and external factors – the interactions are not just one way. Socio-material factors that operate in an individual school can also act to shape external environments over time as ideas and practices from individual schools are assimilated in the broader environment.
Figure 6: External and socio-material factors that shape ICT pedagogical practices

For example, policy is often influenced by leading edge practices that are tried and evaluated within a school or schools. Indeed, school leaders can play an important role in advocating for or resisting particular policy directions. Approaches to ICT integration that result from the combination of a school’s ethos, leadership and organisational structures may be held up to be exemplary and shift societal expectations about what are possible and indeed desirable practices within schools. New spaces for learning that are implemented within a school may act to influence the direction of emerging pedagogies in the external environment. It is also possible that students’ use of ICT within school may influence the extent and nature of their out of school technology use, particularly if their experiences at school provide them with exposure to new ICT applications. Further, the needs of the education system can be a significant driver of some new technologies and applications.

Interplay between socio-material factors and individual factors

There is also significant interplay between socio-material and individual factors as depicted in Figure 7. For example, as has been shown in this study, the practices of the more experienced teachers and the signature pedagogies they may employ play a significant role in shaping the beliefs about pedagogy of the graduate teachers. The organisational structures, local IT policies and the built pedagogies can mediate the transformative desires and capacities of the graduate teachers. Working the other way, graduate teachers with very strong views and skills in integrating ICT may, through example, influence the practices of their more experienced peers. Graduate teachers with strong transformative capacities may act as agents of change
within their schools to affect curriculum and subject cultures.

Figure 7: Socio-material and individual factors that shape ICT pedagogical practices

**Wicked problems – more than teacher knowledge**

Existing literature and research currently positions teachers and teacher knowledge at the centre of the wicked problem that is ICT integration. In essence, issues related to ICT integration in schools currently focus on how teachers make use of ICT in their teaching practices, with flow on effects to how students learn. Recent policy around ICT integration in schools has a clear focus on teacher practices. This study has also focused on teacher practices, specifically those of recently graduated teachers with respect to ICT integration, and how those practices come to be and to develop. In contrast to current approaches that are dominated by a focus on teacher knowledge as the solution to the problem of ICT integration in schools, my approach clearly shows the complexity and interdependent nature of the problem. The factors that shape ICT pedagogical practices of graduate teachers extend far beyond notions of graduate teacher knowledge and encompass a much broader range of factors.

The diagrams presented so far are an attempt to map the interplay between three domains of factors that, when combined, mediate or shape the ICT pedagogical practices of graduate teachers. However, a simple mapping carries with it deterministic connotations, that is, that the graduate teachers’ practices are the inevitable result of the interplay of these factors. This study has shown a more agentive view, where the graduate teachers have more agency than a
deterministic view would suggest. This study has shown that the graduate teachers make deliberate, yet different, choices around ICT-based pedagogical practices and that these choices sit in the intersection between the external environment, the individual factors and the socio-material factors (Figure 8).

Figure 8: Factors that influence choices about ICT pedagogical practices

My study has shown that the choices graduate teachers make about their ICT-based pedagogical practices are influenced by their individual beliefs about what is worthwhile to do when integrating ICT, beliefs that may be grounded in personal experience based on their own use of technology, their own educational experiences and derived from what they have been taught about integrating ICT in teacher preparation studies and practicum experiences, that is, by their folk and taught pedagogies. Choices about ICT-based pedagogical practices are also mediated by their personal capacity to use or integrate ICT, based on their technological, pedagogical and content knowledge (TPACK).

What this study has also shown is that many of the graduate teachers in this study bring strong technology skills and positive predispositions to integrating technology into their teaching practice. I have shown that despite the barriers to integrating ICT that may exist, the desire to integrate ICT and to learn more about how to integrate ICT is still strong, even among the more sceptical graduate teachers. The graduate teachers share an acceptance of the importance of integrating ICT and an openness to new possibilities and pedagogical paradigms.
This study also shows that materiality matters enormously in the integration of technology. The choices teachers make about their pedagogical practices are also strongly influenced by the built environment including access to ICT equipment and networks and the nature of the available spaces in which to teach. Organisational structures, local school policies and curriculum can directly and indirectly influence the choices made by graduate teachers around their pedagogical practices.

Choices around pedagogical practices are also shaped by the prevailing ethos and practices within a school, particularly those of the more influential experienced teachers within a school. I have established that a community of practice that demonstrates characteristics of insularity and resistance to change is likely to reproduce rather than transform existing practices. School leaders can act to foster a more outward-looking and innovative community of practice where transformation rather than reproduction of practice is valued.

The choices the graduate teachers make are also influenced by their personal capacities to be transformative – their capacity to resist or subvert situations and practices that are inconsistent with their own beliefs and preferences about pedagogical practices; to coerce elements of the assemblage that is a school to their own preferred ends.

The choices that graduate teachers make around the use or integration of ICT are based on the unique situation in which they find themselves in any one school, on any one day, with any one group of students, in any one classroom, with any one curriculum to implement. In some cases the choices made by the graduate teachers may represent a deviation from their beliefs about ICT and pedagogy but they represent a practical wisdom or phronesis, a judgement about what is possible and what is most wise to do within the prevailing culture, given all the elements that are in play at that particular time.

This study has shown that graduate teachers bring a variety of skills, knowledge and dispositions towards integrating ICT. This study has also shown that a large range of external, individual and socio-material factors act in somewhat messy ways to shape the ICT-based pedagogical practices of graduate teachers, sometimes resulting in the graduate teachers using pedagogical practices that are at odds with their professed beliefs and in less transformative ways than perhaps they desired. My insights into the complexity of graduate teachers’ integration of ICT lead me to conclude that paying attention to only one set of factors, for example to teacher knowledge is not the answer. It may be part of the answer but a focus on teacher knowledge alone is unlikely to succeed since it is only tackling one element of the ‘wicked’ problem. Rather, those with responsibility for implementing education policies that have the goal of transforming learning and teaching through ICT integration need to pay attention to a much wider range of issues, both big and little, material, pedagogical and social.
I have also shown that the graduate teachers are able to exert agency or choice in their practices and, for some, a determination to overcome factors that may impede their capacity to integrate ICT in more transformative ways.
Chapter 8 – Conclusion, implications, recommendations and limitations

8.0 Introduction
This study of emerging ICT-based practices of graduate teachers in a school ‘in the middle’ has exposed the complexity that is inherent in the integration of ICT into schools, and encourages thinking about ICT integration to move beyond reductionist and simplistic approaches to what amounts to a ‘wicked’ problem.

In this chapter I will first provide conclusions that are derived from my findings and relate these to the research questions that are at the core of this study. I then identify implications and recommendation for policy makers, for schools who are implementing government policies that focus on ICT integration, as well as implications for teaching practice. This chapter also identifies the limitations of this study and implications for further research into how ICT-based pedagogical practices are developed.

8.1 Revisiting the questions
Two key questions, as outlined in Chapter 1, guide this study:

How do beginning teachers’ ICT-based pedagogical practices come into being through experiences in their early years of teaching? [8.1.1]

What are the prospects for transformative practice in the integration of ICT? [8.1.2]

8.1.1 Developing ICT-based pedagogical practices
This study has clearly established that the integration of ICT into graduate teachers’ practices is far more complex than is often suggested or implied in policy and constitutes a ‘wicked problem’ – where messiness and complexity dominate. The fieldwork was set in a school that was perceived as ‘doing well’. Academically the school performed well compared to many other schools, most of the staff had been there for many years, and the school had an ICT network and resources that were superior to most other government schools in the district. Yet despite the general perceptions of the school’s performance, school leaders, staff and students all perceived the integration of ICT into learning and teaching as problematic, both in extent and nature. The graduate teachers, who were all digitally confident, made significantly different use of ICT in their emerging pedagogical practices and struggled to use ICT in transformative ways.
Wicked problems, by their very nature, do not have simple or easy solutions. The complex interplay of factors that contribute to the problem, in this case the problem of integrating ICT into teaching practices, acts against simple or linear solutions. Understanding the complexity of factors that contribute to the integration of ICT is crucial if solutions are to be found. The findings of this study, as outlined in Chapters 4-6, identified a range of factors and circumstances that shaped the development of the ICT-based pedagogical practices of the graduate teachers in the early stage of their career.

These findings have led me to propose a new way of conceptualising the factors that shape the ICT-based pedagogical practices of graduate teachers. Whilst drawn from the experiences of the graduate teachers in this study, I believe this way of conceptualising the issues frequently associated with ICT integration in schools may have application beyond the setting of this study. The model, outlined in detail in Chapter 7 of this study and briefly summarised here, identifies three domains of factors that interact in somewhat messy and complex ways to shape how graduate teachers’ ICT-based pedagogical practices develop:

- External environment – this domain includes factors such as the rapid pace of technological change, societal and policy expectations on schools’ integration of ICT, current trends towards teacher accountability and performativity, emerging pedagogies and the use of technologies by students beyond school [see 7.3.1].

- Individual factors – this domain includes teacher knowledge about the content they teach, how to teach and how technology might play a role in that, that is, their TPACK, but also includes the beliefs about pedagogy and ICT that graduate teachers bring with them from their own educational experiences, their emerging identity as 21st century teachers, their career aspirations and their capacity to be transformative [see 7.3.2].

- Socio-material factors - this domain includes the influence of the practices and pedagogies of the more experienced teachers with whom the graduate teachers work, the curriculum, the ethos or culture of the school and the subject disciplines in which the graduate teachers operate, the physical spaces in which teaching and learning takes place, the IT network and resources, the organisational structures and local policies that impact on how ICT can be integrated [see 7.3.3].

The model is a way of representing the notion that these factors – external factors, individual factors and socio-material factors – interact reflexively to mediate the choices graduate teachers make about how their ICT-based pedagogical practices are enacted. I assert that practice is not just a social or human phenomenon, shaped by beliefs and human actions. Rather, the heterogeneous assemblage of these factors in a school, human and material,
combine in complex and, at times unexpected, ways to shape choices about how ICT is used in learning and teaching.

Current policies aimed at overcoming the uneven integration of ICT in schools have a central focus on the role of the teacher, with a particular emphasis on overcoming deficiencies in teachers’ knowledge, couched in terms of pedagogical, content and technological knowledge (TPACK). This study has shown that, whilst TPACK is important, many factors other than teacher knowledge interact to play a significant role in shaping how graduate teachers ICT-based pedagogical practices emerge once they start teaching. The model I propose here provides a much richer way of conceptualising and understanding the problem of integrating ICT into learning and teaching in schools.

In the following sections I highlight two areas in particular that emerge from the model that provide a fresh lens on two important factors that shape graduate teachers’ ICT-based pedagogical choices – their beliefs and their capacity to exert agency.

**Significance of pedagogical influences on graduate teacher beliefs**

This study has also provided a new way of envisaging the factors that shape graduate teachers’ beliefs about learning and teaching and, within that, the role that technology might play. This new way of conceptualising what contributes to teachers’ beliefs provides a richer understanding of the complexity of the issues involved in integrating ICT into schools. Within the model, teacher beliefs are highlighted as an important individual factor that can shape pedagogical practices. Indeed, in Chapter 2 I identify from the literature that teacher beliefs are a strong determinant of their practice, but that beliefs are not fixed and can be changed and that practice itself, the enactment of a practice can, in turn, shape teachers’ beliefs.

I identified four pedagogies that shape the beliefs about ICT integration held by graduate teachers in the early years of their careers, and which are a key factor in how they enact the integration of ICT:

- folk pedagogies – the beliefs about integrating technology and pedagogy derived from personal experiences of ICT and education as students
- taught pedagogies – propositional knowledge about ICT and pedagogy developed during teacher preparation studies
- signature pedagogies – traditional or emergent approaches to teaching enacted by the more experienced teachers within a community of practice
- built pedagogies – determined by the physical and technological spaces in which the graduate teachers perform their practices.

The first two pedagogies are those the graduate teachers bring with them to their teaching
career. However, this study reinforces the idea that the knowledge and beliefs teachers bring with them are not a fixed commodity, but are subject to change and evolution as graduate teachers perform their practice, a knowing-in-practice. In particular this study has shown that, once they commence teaching, the pedagogies adopted by their more experienced colleagues as well as the built environment in which they teach can also shape the ICT-based pedagogical practices of graduate teachers.

Where those existing practices are reflective of traditional signature pedagogies, and where the community of practice of teachers is resistant to change, as in this study, new entrants to the profession tend to reproduce existing practices, rather than develop new, transformative practices, even if those practices are inconsistent with their beliefs and preferences about ICT-based pedagogical practices. This suggests that attempts to integrate ICT in schools cannot ignore the influence of existing teachers’ practices.

This study also demonstrates the significance of the built environment on pedagogical choices made by graduate teachers. In this study, the built environment and physical spaces acted in ways that restricted the graduate teachers’ abilities to adopt more innovative or best practice pedagogies, at times forcing them to reproduce existing practices that were at odds with their desired practices. The role of space on learning and teaching needs to be made visible in attempts to facilitate ICT integration.

This way of viewing how beliefs are shaped highlights the reflexivity between the three domains of factors. Pedagogical influences on beliefs emerge from the external environment, from individual experiences and from the socio-material world of the school.

Mediated practices – the capacity for agency
This study also clearly establishes that whilst the combination of factors outlined in the three domains mediates choices about practice, they do not determine practice. This study shows that graduate teachers, who are often positioned as being without power, have the capacity to exert individual agency in their pedagogy, although at times that capacity is constrained. In Chapter 7 I identified four categories of graduate teachers that reflect their level of agency with respect to the existing practices at the school:

- **deliberate adopters** of existing dominant pedagogical practices that made limited use of ICT
- **reluctant followers** of dominant pedagogical and ICT practices in order to maximise re-employment potential, or due to constraints of the built environment
- **intentional resistors** who resisted the dominant pedagogical practices to pursue more progressive practices that made more integral use of ICT
- **active transformers** who, although absent from my fieldwork, go beyond resisting
existing practices to proactively influence other teachers adopt more transformative practices.

Thus, I argue that graduate teachers are agentive, although their agency is mediated by various factors identified earlier.

8.1.2 Prospects for transformative practice in the integration of ICT

In Chapter 7 I discussed the notion of a continuum of ICT integration from simply using ICT to enhance or modify existing practices, to transformative practices that involve the re-imagining of practices, embedding ICT in ways that have previously not been conceived.

This study showed that the majority of the graduate teachers at RiverValley Heights was not able to or, for some, not predisposed to integrating ICT in ways that could be considered transformative. For the most part the graduate teachers largely layered ICT onto the dominant, transmissive pedagogies that prevailed at the school, rather than embed ICT in their teaching, or use ICT as a catalyst to transform teaching practices. The tendency to reproduce existing signature pedagogies was amplified when the graduate teachers were teaching out-of-field, in unfamiliar disciplines.

This study clearly demonstrated a gap between the espoused beliefs about ICT integration held by the graduate teachers at RiverValley Heights and their enacted practices around ICT integration. The graduate teachers all professed a belief in the importance of ICT in learning and teaching, and the need for a more participative pedagogy, but they did not all enact that belief in their own teaching. For some of the graduate teachers, their inability to integrate technology to the extent they wanted to and in ways that aligned with their pedagogical beliefs represented a lived dilemma, a contradiction between their aspirations and the reality of performing a practice in a social and material environment.

At first glance, the experiences at RiverValley Heights suggest the prospects for transformative practice with ICT are not high. As I claim in 8.1.2, a diverse range of factors mediated the ICT-based pedagogical choices made by most of the graduate teachers in ways that were limiting, rather than transformative.

However, there were glimpses of the potential for transformation of practice with of ICT. I contend that Lisa’s experiences, outlined in Chapter 6 and discussed in Chapter 7, in exploring and experimenting with a variety of ways of embedding ICT in her teaching, illustrate that the work of transforming practice takes place in the doing of that practice. Rather than waiting to be shown what ICT integration might look like, Louise’s preferred stance, or waiting for the material barriers to ICT integration to be removed, Kerrie’s stance, Lisa explored what it could look like for her and her students through action, by making
technology an integral part of as much of her practice as was possible and in ways that differed from the prevailing pedagogy. In the process, Lisa resisted the prevailing pedagogical and ICT practices within the school and developed new approaches to her teaching. Her experiences demonstrate that moving along the ICT integration continuum towards transformative integration of ICT is possible.

I assert that transformation of any practice, beyond the integration of ICT, implies moving away from those practices that have become normalised. Transformation of practice requires reflexivity on the part of the teacher, an ability to see a bigger picture, a recognition that new technologies pose challenges for entrenched ways of being, and that new knowledge and practices need to be found. Transformation of practice also requires courage to go against the flow, a confidence to develop new ways of enacting a practice and resilience in the face of barriers. New practices, including those that involve ICT, emerge out of the enactment of that practice. Enacting new ways of integrating ICT into learning and teaching occurs within the reflectivity of a specific socio-material context and culture; it is relational. However, the context and culture is not deterministic but mediates the enactment of attempts at transformative practices. New knowledge, which emerges from the enactment of new practice, changes the practitioner, contributing to their process of becoming.

8.2 Implications and recommendations

Policy initiatives – beyond TPACK

Initiatives designed to support the implementation of ICT integration policies that have been part of the education policy landscape for well over fifteen years have met with limited success, in terms of the disappointing extent and nature of ICT integration into school classrooms. I assert that the reason for the policy failure stems largely from a lack of understanding of the process of translating policy into practice at the school level. This study provides a lens through which to view the complex and messy processes that shape how teachers in schools enact ICT integration policies.

Current national policies aimed at increasing ICT integration in schools include specific initiatives aimed at improving teachers’ knowledge and skills in integrating ICT, that is, a focus on increasing their TPACK. TPACK is currently offered as the answer to problems with integrating ICT into schools. Whilst TPACK is useful in framing teacher knowledge and its relationship to ICT integration, I have shown in this study that many factors in addition to teacher knowledge are at play when teachers attempt to integrate ICT.

Initiatives designed to support the integration of ICT should take into consideration the complexity of issues involved in policy implementation at the school level, as identified in
this study, rather than offering initiatives that only focus on one aspect of the problem.

The role of school leadership
I argue that school leaders have a significant role to play in the translation and implementation of policies related to the integration of ICT. School leaders have direct influence over a number of socio-material factors that mediate the choices teachers make about how they enact their ICT-based pedagogical practices.

In particular, school leaders play a pivotal role in facilitating the development and maintenance of an outward looking culture or ethos, where teachers are open to refreshing their pedagogical practice and the possibilities offered by ICT. Leaders can and should foster a culture where experimentation with pedagogical practices that integrate ICT in new ways is supported and valued and where transformative capacities of teachers, including graduate teachers, are actively fostered. At the core of such a culture is giving as much prominence to discussion and reflection on pedagogy and ICT integration as is given to the nuts and bolts of managing ICT networks, infrastructure and equipment.

Understanding the complex factors that interact to shape the pedagogical practices of more experienced secondary school teachers and acting at a whole school level could facilitate a shift away from a reliance on transmissive pedagogies to more participative pedagogies. This would help to provide a platform for graduate teachers to apply their digital skills and knowledge.

Given the significant influence that experienced teachers have on the practices of graduate teachers, school leaders should identify and support ICT and pedagogical champions within their school to act as mentors to graduate teachers. Such an approach would foster the development of a community of practice of teachers who share a common goal of integrating ICT and would build on the technological beliefs, knowledge and skills of the graduate teachers. Graduate teachers would be empowered to be more audacious in their practices and to experiment with more innovative pedagogical practices that integrate ICT, under the guidance of more teachers who are open to more progressive pedagogies. School leaders should also minimise the extent to which graduate teachers are required to teach out-of-field.

Further, school leaders can play an important role in shaping the built environment of a school, to foster spaces that actively encourage ICT integration, as well as to address ICT resourcing issues to ensure ease of access to ICT equipment and networks.

School leaders have a responsibility to examine the socio-material world of the school to identify the little things, the local policies and practices around keys, timetables, internet credits and booking systems, as well as the big things that may be acting to constrain or
enable the ICT-based pedagogical choices made by teachers, including graduate teachers. At a practical level, school leaders should ensure that those teachers, including graduate teachers, with more developed digital skills and who are positively pre-disposed to integrating ICT into their pedagogical practices in transformative ways, are allocated to teaching spaces that support ICT integration.

Policy relating to ICT integration, by its nature, tends to de-materialise the context. School leaders need to put the material back into the frame and interpret and translate policies materially, socially and pedagogically.

**Teacher education**

Graduate teachers’ knowledge about ICT integration is an important factor in shaping their pedagogical practices, albeit not the only one. It is not sufficient to be told about the importance of ICT integration, to be given only propositional knowledge about ICT integration. Rather, pre-service teachers need to experience effective ICT integration in their teaching disciplines first hand as students and during their practicum experiences to bolster their practical knowledge of integrating ICT and to help counter the effects of folk pedagogies on their beliefs about pedagogy and ICT.

The results of this study reinforce recent calls for universities to work more closely with governments and education systems to ensure that pre-service teachers have exposure to best practice integration of ICT during their teacher preparation. New models of professional experience should be developed to ensure that pre-service teachers see first hand best practice ICT-based pedagogical practices in their teaching disciplines. Further, teacher education institutions could adopt best practice ICT integration themselves in their teacher education programs, and explore innovative and different models of the teaching practicum to increase opportunities for pre-service teachers to develop a practical understanding of effective ICT integration.

8.3 Limitations

Like any research project, this study has a number of limitations. The scope of this study was deliberately small, focused on a single school and a small number of the graduate teachers within the school. The small sample size, focused on a single research site allowed for a deep, naturalistic inquiry into the experiences of the graduate teachers, their beliefs, their teaching and the range of influences on them. The interpretation and representation of the data is therefore localised and highly contextual. It was not intended that the findings from this research would be generalisable to all schools or necessarily transferable to other schools. However, the conceptualization of the factors that influenced practice at this school may well
have application as a framework for understanding or investigating factors that may be present in different school settings.

The school was chosen as a school ‘in the middle’, that is a school in an average, middle-income suburb, with a typical level of ICT infrastructure. It was neither a high achieving school academically nor was it particularly disadvantaged. It was not overflowing with technology but it was not technology-poor. It was intended to be a ‘typical’ case. However, there is really no such thing as typical. The school had an unusually stable teaching staff, with a high proportion of very experienced teachers approaching retirement age. It also had an unexpectedly high proportion of portable classrooms. During this study the school experienced significant upheaval as a result of the departure of the incumbent Principal. This had a significant effect on the leadership of the school and on the practices that were performed at the school.

All of these factors seemed to have had a significant bearing on the findings; indeed the situation at the study site highlighted the importance of these factors. Whilst these factors exist in lesser or greater degrees in other schools, every school deals, in its own way, with staffing, leadership, built environment, localized policies, students and socio-economic factors.

A further limitation was that the majority of the graduate teachers who participated in this study taught in the Sciences or Maths disciplines. Maths in particular has a reputation for being a discipline that is resistant to the integration of technology. The focus on teachers in these disciplines and the pedagogies they adopted may have influenced the ways in which my findings were developed.

The influence of age and gender on choices about pedagogy and ICT integration was not part of this study, but may be an area requiring further investigation.

### 8.4 Areas for further research

The conceptualisation of the diverse and inter-related factors that influence graduate teachers’ ICT-based pedagogical choices when integrating ICT is an important addition to our understanding of the wicked problem of ICT integration. As mentioned above, this conceptualisation of the factors influencing practice may well have application as a framework for investigating factors that influence teacher’s pedagogical choices in different educational settings, in different teaching disciplines, and at different stages of their careers.

For example, the framework could be used to investigate the factors influencing teacher choices in more innovative communities of practice of teachers who are integrating ICT in
transformative ways. Identifying the conditions that exist in an outward looking community of practice of teachers could assist school leaders to increase the likelihood of successfully implementing ICT integration policies at the school level.

Integration of technology into teacher education programs has been identified as an important ingredient in to ensuring graduating teachers are appropriately equipped with the skills and knowledge necessary to teach in ICT enriched learning environments. Integration of ICT into teacher education may also be affected by similar factors that schools face. The framework could be used to investigate factors that might be at play in teacher education settings.

The framework could also be extended to investigate factors that are at play in different teaching disciplines. Are some disciplines more open to integrating ICT in transformative ways than others?

This study had a focus specifically on graduate teachers, in the beginning stage of their careers. However, investigation of how the factors might influence choices at different stages throughout a teacher’s career would be of interest. How might additional experience contribute to a stronger sense of agency among graduate teachers? Does the influence of their more experienced colleagues diminish over time? Are there shifts in power relations with additional experience?

This study took place at a time when desktop computing was the dominant form of ICT in schools. Since the fieldwork for this study was completed, advances in technology have been significant. Computers have become cheaper, smaller and mobile and tablet technologies have taken a significant hold in schools, changing substantially the way that students and teachers can access technology in the classroom. Further research could examine the impact of mobile technology on the factors that shape ICT-based pedagogical practices - do tablets remove barriers, or do the little things surrounding the implementation of more mobile technologies act as just as big a barrier as the little things that surround desktop technologies? Are localized enactments of policy surrounding tablet technologies as fraught as this study has shown older technology integration to be?

8.5 Concluding remarks

‘Happy families are all alike: every unhappy family is unhappy in its own way.’ (Leo Tolstoy, Anna Karenina, p.1)

When Tolstoy wrote this most famous of opening lines, he was setting the scene for an epic novel about the intricacies of family relationships, about the complex entanglements between the families and individuals who form the key characters in the novel. The reader becomes a
silent observer of a collection of unhappy families, privy to the daily familial crises they experience. Tolstoy uses family as a lens through which the reader is exposed to elements of the culture in which the families live and what is considered acceptable practice in that culture. He does this through sharing the seemingly insignificant as well as the critical moments in the lives of his characters.

In a similar way, albeit without the scale, the romance, the tragedy and the unsurpassed writing skill of Tolstoy, this study has taken the position of using the community within a school as a lens to observe and examine the culture and the practices around the integration of ICT, particularly those of the graduate teachers. This study has shown that the complex entanglements between the social and material players in the school community, and the seemingly insignificant moments in the school, centred around things as simple as keys, as well as the critical moments in school can play a significant role in shaping the practices within that school. The prevailing culture and practices, the physical environment, and the leadership acted against the integration of ICT. It was into this ‘family’ that the graduate teachers who were the subjects of this study entered and attempted to enact their beliefs about integrating ICT into their pedagogy. The combination of different socio-material elements within this particular school at this particular time was unique to this school and gave rise to a culture where integrating ICT, particularly in ways that were transformative, was challenging, to say the least.

This study makes an important contribution to our understanding of the factors that contribute to and mediate the pedagogical choices teachers make when attempting to integrate ICT. I have provided a new way of conceptualising these factors into three reflexive domains that formed a framework for investigating how ICT-based pedagogical choices are mediated. The framework provides a lens through which we are able to develop a more complete understanding of the complexity and messiness of the wicked problem that the integration of ICT into teaching and learning represents.

I have shown that more attention needs to be paid to the translation and implementation of overarching education policies at the school level if policy goals around ICT integration are to be achieved. The study has shown that integrating ICT into classrooms is clearly a socio-material practice and that this gives rise to a need for school leaders to examine the socio-material aspects of a school and the interactions between these elements in order to identify and remove unexpected barriers to ICT integration. Within this, graduate teachers’ practices and their beliefs about their practice of teaching are not fixed, but emergent and subject to change.

The findings of this study suggest that the ‘wickedness’ of integrating ICT into teaching
practice is compounded when referring to the practices of graduate teachers. Not only do graduate teachers have to contend with the same complex set of influencing factors shared with more experienced teachers, they also have to contend with teaching in unfamiliar disciplines, in an unfamiliar settings, and with an uncertain employment future. As newcomers to the profession they also need to contend with all the difficulties of establishing their identity as members of a community of practice, of being seen to belong to an existing practice.

This study has been a study of ‘teacher becoming’, in a context of the embodied routines and habits of the community of practice of teachers, the objects and technologies of teaching, the physical spaces and organisational context of the school. Importantly, I have shown that graduate teachers, as newcomers to an established community of practice, are not without power to exercise individual agency to adopt, resist or subvert existing practices. They make choices, deliberate or otherwise, about how they integrate ICT, but many different and interrelated things mediate their choices.

This study supports the notion that the work of transforming practice takes place in the doing of that practice. I have demonstrated that, even in the face of mediating factors that act to limit ICT integration, it is possible for graduate teachers, through exercising agency, to make pedagogical choices that move them away from normalised practices towards more transformative ways of integrating ICT and that in doing so they contribute to the transformation of practice.
References


Professional Standards for Teachers. Carlton South: Education Services Australia
Retrieved from


Brown, D., & Warschauer, M. (2006). From University to the Elementary Classroom:


doi:10.1162/dmal.9780262524834.001


integration of information and communications technologies into classroom practice. 
Canberra: Australian Curriculum Studies Association.


doi: 10.1111/j.1365-2729.2011.00465.x


Appendix 1 - Interview question frameworks

The following questions were used as a framework for the semi-structured interviews held with the graduate teachers at the beginning and the end of the fieldwork phase of the study [see 3.3.3].

Initial Interview Question framework

1. How did you come to be a teacher?

2. What are your philosophies, your beliefs about learning and teaching?

3. What are your beliefs about the role of ICT in learning and teaching?

4. How would you describe your own use of ICT? Your own skills?

5. What sort of ICT use did you experience in your own schooling?

6. What sort of ICT use did you experience during your teacher preparation program?

Final Interview Question framework

1. What have you learned this year? What changes do you see in yourself this year?

2. Who inspires you? Where does your inspiration for teaching come from? Which teacher at The College gives you the most inspiration? What aspects of his/her teaching stand out to you? What interactions did you have with your mentor throughout the year? Whose opinion counts?

3. What might you do if?
   a. You had no ICT constraints
   b. If you were in charge of the curriculum?
   c. You could change the mentoring approach?

4. What would your ideal teaching space look like? Feel like? Sound like?
5. Were there approaches you would have liked to adopt but were not how things were done around here? What were they?

6. What do you fear?

7. Where do you see yourself in five years time?

8. Where are you now?
   a. Still struggling to juggle
   b. Fake it till you make it
   c. On a discovery adventure
   d. The master’s apprentice
   e. In my comfort zone

9. Can you rank the following statements about ICT
   a. I’m happy about the way I use ICT in my classroom. I don’t feel I need to do things differently
   b. Most of the time I can’t see any real advantage in using ICT
   c. I feel constrained in how I can use ICT in my teaching at this school. I want to use it more but I can’t.
   d. I want to use ICT more than I do but I really don’t know how I can use it in my curriculum.
   e. I’m happy with how I use ICT but I want my students to be able to use more ICT in my classes.
Appendix II - Post observation reflection guides

The following devices were used to guide post-observation discussions with the graduate teachers, and post-observation reflection by the researcher [see 3.3.3]

Post-observation discussion

1. How did you arrive at the goals for the lesson? What influenced your goals for the lesson?

2. Why did you decide in this approach? Were there any restrictions or constraints that influenced your choice of teaching approach?

3. How do you think the lesson went? What might you have changed? Why?

4. What were your goals for the lesson?

| Make learning more interesting |  |
| Provide opportunities to learn from experts |  |
| Provide real world examples |  |
| Improve student performance in assessment and exams |  |
| Increase learning motivation |  |
| Individualise the learning experience |  |
| Foster self-regulation |  |
Foster collaboration
Foster communication skills

What resources were used?

<table>
<thead>
<tr>
<th>Presentation tools</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Equipment &amp; hands on materials</td>
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<tr>
<td>Tutorial software</td>
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<tr>
<td>Multimedia production tools</td>
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<td>Data logging tools</td>
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<tr>
<td>Simulation software/games</td>
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<tr>
<td>Communication tools (email, chat, etc)</td>
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<tr>
<td>Digital resources</td>
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<tr>
<td>Mobile devices</td>
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<tr>
<td>Interactive whiteboard</td>
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<td>Learning Management system</td>
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<tr>
<td>Research tools</td>
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</tbody>
</table>

**Pedagogy Analysis framework**

Used to summarise and give an overview of the teaching strategies used in observed classes

<table>
<thead>
<tr>
<th>Student role in lesson</th>
<th>Lesson Date</th>
<th>Lesson Date</th>
<th>Lesson Date</th>
<th>Lesson Date</th>
<th>Lesson Date</th>
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<tbody>
<tr>
<td>Working on same learning materials</td>
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<td>at same pace/sequence</td>
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<tr>
<td>Working at own pace</td>
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<tr>
<td>Worksheets/exercises to practice skills and procedures</td>
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<td>Creating a product</td>
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<tr>
<td>Looking up ideas and information</td>
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<tr>
<td>Exploratory or inquiry activity (open ended)</td>
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<tr>
<td>Set experiment</td>
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<tr>
<td>Discovering principles and concepts</td>
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<td>Class activity eg game</td>
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<tr>
<td>Giving presentation</td>
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<tr>
<td>Determine own content goals for learning</td>
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<td>Explain and discuss own ideas with peers and teacher</td>
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<tr>
<td>Collaborate with peers from other schools within &amp; outside the country</td>
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<tr>
<td>Revision</td>
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<tr>
<td>Answer tests</td>
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<tr>
<td>Self/peer evaluation</td>
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<tr>
<td>Communicate with outside experts</td>
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<tr>
<td>Reflect on own learning</td>
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<tr>
<td>Contribute to community projects</td>
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<tr>
<td>Processing and analysing data</td>
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<tr>
<td>Teacher practice</td>
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<td>Teacher’s lecture, presentation,</td>
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<td>Writing on board</td>
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<td>Lab experiments</td>
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<tr>
<td>Exercise</td>
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<td>Set text book exercises, or handouts</td>
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<td>Initiate student led class discussion</td>
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<tr>
<td>Initiate teacher led class discussion</td>
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<tr>
<td>Questioning – open ended</td>
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<td>Studying natural phenomena through simulation.</td>
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<td>Field study activities</td>
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<tr>
<td>Initiate collaborative work</td>
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<td>Support team building activities</td>
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<tr>
<td>Provide remedial or enrichment to individual or small group</td>
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<tr>
<th>Assessment practices</th>
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<tbody>
<tr>
<td>Extended projects – individual or group</td>
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<tr>
<td>Short project – individual or group</td>
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<tr>
<td>Product creation</td>
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<tr>
<td>Oral presentation – individual or group</td>
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<tr>
<td>quiz/test/exam – oral or written</td>
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<td>Portfolio</td>
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<td>performance</td>
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# Appendix III - Weekly Record of ICT use in the classroom

The following device was used to elicit additional data from the graduate teachers on their integration of ICT in classes that did not form part of the observation schedule [see 3.3.3].

Name: ________________________________

Week: / / 08 to / /08

<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Year Level</th>
<th>Describe how YOU used ICT</th>
<th>Describe how your STUDENTS used ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/09/08</td>
<td>English</td>
<td>10</td>
<td>Showed a powerpoint on the Interactive Whiteboard</td>
<td>Students responded to discussion threads on our Virtual Classroom site</td>
</tr>
<tr>
<td>2/09/08</td>
<td>Hums</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Appendix IV – Ethics approvals

The following documents verify that this study was conducted in accordance with ethical practices, as determined by The University of Melbourne Graduate School of Education Human Ethics Advisory Group and the Department of Education and Early Childhood Development Office for Policy, Research and Innovation.
Ms Nicky Carr
14 Woodchurch Close
RINGWOOD 3134

Dear Ms Carr

Thank you for your application of 4 December 2007 in which you request permission to conduct a research study in government schools titled: Graduate teachers and their use of technology: acted upon and acting on the socio-material world of their school.

I am pleased to advise that on the basis of the information you have provided your research proposal is approved in principle subject to the conditions detailed below.

1. Should your institution’s ethics committee require changes or you decide to make changes, these changes must be submitted to the Department of Education and Early Childhood Development for its consideration before you proceed.

2. You obtain approval for the research to be conducted in each school directly from the principal. Details of your research, copies of this letter of approval and the letter of approval from the relevant ethics committee are to be provided to the principal. The final decision as to whether or not your research can proceed in a school rests with the principal.

3. No student is to participate in this research study unless they are willing to do so and parental permission is received. Sufficient information must be provided to enable parents to make an informed decision and their consent must be obtained in writing.

4. As a matter of courtesy, you should advise the relevant Regional Director of the schools you intend to approach. An outline of your research and a copy of this letter should be provided to the Regional Director.

5. Any extensions or variations to the research proposal, additional research involving use of the data collected, or publication of the data beyond that normally associated with academic studies will require a further research approval submission.
5. At the conclusion of your study, a copy or summary of the research findings should be forwarded to Education Policy and Research Division, Department of Education and Early Childhood Development, Level 2, 33 St Andrews Place, GPO Box 4367, Melbourne, 3001.

I wish you well with your research study. Should you have further enquiries on this matter, please contact Chris Warne, Project Officer, Education Policy and Research, by phone on (03) 9637 2272 or by email at <warne.christine.p@edumail.vic.gov.au>.

Yours sincerely

Dr Jim Tangas
A/Assistant General Manager
Education Policy and Research

15/10/09

crc
3 February 2008

Prof. Lyn Yates

Yalumba Graduate School of Education
The University of Melbourne

Dear Prof. Yates,

I am pleased to advise that the Melbourne Graduate School of Education Human Ethics Advisory Group (HGEAHEG) has approved the following Minimal Risk application:

Project Title: Graduate Teachers and their use of technology: Acted upon and acting on the socio-material world of their school.

Researchers: Lyn Yates, Nicole Carr & Danielle Mulcahy

Ethics ID: 07HUG9

This project has been approved for the period 3 February 2008 to 31 December 2009.

It is your responsibility to ensure that all people associated with the research are aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years or upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approved application:

(a) Limit of Approval: Approval is limited strictly to the research as submitted in your project application.

(b) Amendments to Projects: Any subsequent variations or modifications you wish to make to the project must be notified formally to the Human Ethics Advisory Group for further consideration and approval before the revised project can continue. If the Human Ethics Advisory Group considers that the proposed amendments are significant, you may be required to submit a new application for review of the revised project.

(c) Unforeseen or adverse effects: Researchers must report immediately to the Advisory Group any actions which might affect the safety of the participants or participants’ well-being, or the ethical acceptability of the project. Failure to do so may result in suspension of approval or cancellation of approval.

(d) Monitoring: Projects are subject to monitoring at any time by the Human Research Ethics Committee.

(e) Annual Reports: Please be aware that the Human Research Ethics Committee requires that researchers submit an annual report on each of their projects at the end of the year, or on the conclusion of a project if it concludes before the end of the year. Failure to submit an annual report will mean that ethics approval will lapse.

(f) Auditing: All projects may be subject to audit by members of the HREC.

Please note that the information in the project is current and the name of the project in any future correspondence.

On behalf of the Ethics Committee I wish you well in your research.

Yours sincerely,

[Signature]

[Name]

[Position]

[Contact Information]

[Institution]

Nicole Carr, Danielle Mulcahy and Human Research Ethics, Melbourne Research Office

Melbourne Education Research Institute (MERI)
Melbourne Graduate School of Education Human Ethics Advisory Group

Phone: 734367, Email: human.ethics@unimelb.edu.au

Melbourne Graduate School of Education, Level 4, Alice Hoy Building
The University of Melbourne, Victoria 3010, Australia

T: +61 3 8344 8552, F: +61 3 9347 2468

W: http://www.human.ethics@unimelb.edu.au

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Plain Language Statement for Principal and ICT Coordinator participants

University of Melbourne; ICT project; ICT 844; 18 December, 2003, version 1.0

Dear [Name],

Graduate Teachers and their use of technology: Acting upon and acting out the cyber-matural world of their school

My name is Vicki Clay and I am currently undertaking a PhD in the Faculty of Education at the University of Melbourne. I am writing to invite you to participate in my doctoral research study. My research is concerned with understanding how graduate teachers in one Victorian secondary school develop their information and communications technologies (ICT) practices in the early years of their careers. It is an empirical examination of how practices relating to the integration of ICT in the classroom are transmitted to graduate teachers and in so doing how those practices may be transformed. This study is trying to understand how graduate teachers’ ICT practices are established, maintained, reinforced, resisted and how they shape other practices within the school.

There is an emerging expectation on newly graduating teachers to use ICT more effectively and to a greater extent than their more experienced colleagues have done to date. This expectation is linked to the notion of graduate teachers being part of the ‘digital native’ generation, with associated assumptions that the ease with which members of this generation use ICT in their personal lives will somehow translate into effective use in their professional lives. However, being part of the ‘digital native’ generation may not be sufficient to ensure effective use of ICT in their professional lives. Understanding how graduate teachers’ ICT practices are developed and what role graduate teachers themselves play in developing ICT practices within a school may inform the development of approaches that support more effective integration of ICT into secondary schools. Findings from this study may form the basis of scholarly journal articles and conference papers.

The focus of this research is on the graduate teachers’ ICT practices. I propose to collect data for this study from multiple sources of information over an entire school year, including observation of recently graduated teachers in the classroom, the computer labs, the staff room and in the everyday work of the school; semi-structured interviews and focus groups; and an examination of documents, artefacts and the physical environment of the school.

Should you choose to participate, you will be asked to participate in a one-hour interview. Interviews and focus groups will be audio-taped and transcribed.

Research of the type intended for this study has the potential to reveal information about participants that can be sensitive. Therefore, pseudonyms will be used in both the final report as well as is final report and transcripts to protect the identity of the research participants. Case will also be described in any formal and informal discussions with the Principal or other staff to protect the identities of the research participants. Any discussion about the findings of the research presented in this report or discussion of findings in any research presentations shall be confidential and not be revealed to any third party except as required for the research conducted as part of the project. Commercial confidentiality and

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Plain Language Statement for Principal and ICT Coordinator participants

University of Melbourne HERC project: 07111061, 10 November 2017, version 1.2

Transcripts will be provided to the research participants for their personal and amendments will be
made where requested. Any staff member who participates in activities that are the subject of
observation or interview is part of this research will be afforded the opportunity to review
transcripts and suggest amendments or omissions.

Participation in this study is entirely voluntary and you may withdraw from the study at any
time. Approval for this project has been obtained from the University of Melbourne Human
Research Ethics Committee.

Further information and clarification of any issue relating to this study can be obtained from:
Professor Lyn Yates
Deputy Vice-Chancellor (Research)
Education Equity and Social Change
Phone: +61 3 8344 8166
Email: Lynes@unimelb.edu

Yours sincerely

Nicky Carr (M. Ed.)

If participants have any concerns about the conduct of this research project they can contact the
Executive Officer, Human Research Ethics, The University of Melbourne, ph: 8341 2073; fax: 9347
6739.
Informed Consent Form – Graduating Teachers and their use of technology Research Study

Project Title: Graduate Teachers and their use of technology: Acted upon and acting on the socio-material world of their school

Name of participant: ____________________________________________________________

Name(s) of Investigators: (1) Nicky Carr (2) Professor Lisa Valles

Phone: 0430118589 Phone: 8344 9166

1. I have received a statement explaining the purpose of this study and the data collection involved in this project.

2. I consent to participate in the above project, the particulars of which - including the nature of the expectations of participation - have been explained to me.

3. I authorize the investigator to observe me in the everyday practices of school life, including teaching and meetings with other staff, and to stimulate interviews with me and conduct focus groups that include me.

4. I acknowledge that:
   (a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
   (b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purpose of research and/or teaching, it may not be of direct benefit to me.
   (d) The privacy of the personal information I provide will be safeguarded and only disclosed where it has been consented to by the individual or is required by law.
   (e) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to ____________ (researcher to specify). Any fragments which will identify me will not be used.

Participant's Consent

Participant: ____________________________________________________________ Date: ____________________________

[Signature]

Witness: ____________________________________________________________ Date: ____________________________

[Signature]

Participants should be given a copy of the consent form also a contains witness.

Participants may request any concerns about the conduct of this research are directed to the Executive Officer Human Research Ethics Board, The University of Melbourne, or 8344 9263; Fax 8344 8739.
### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Chronicle</td>
<td>A paper-based diary produced for school teachers and distributed freely. The Chronicle also contains sections designed for planning, recording attendance and grades for each class taught; as well as handy teaching hints. The Chronicle is widely used by teachers across many Victorian secondary school</td>
</tr>
<tr>
<td>Curriculum day</td>
<td>Also referred to as pupil-free days. Schools can elect to have a limited number of days when students do not attend school. Such days are usually devoted to curriculum planning, professional learning, report preparation or other strategic planning agendas set by school leadership.</td>
</tr>
<tr>
<td>DEECD</td>
<td>Department of Education and Early Childhood Development – the current name of the State Government Department with responsibility for School Education in Victoria. See also Education Victoria and Education Department.</td>
</tr>
<tr>
<td>Digital Education Revolution (DER)</td>
<td>Name of the incumbent Australian Government’s education policy at the time of the study.</td>
</tr>
<tr>
<td>Education Department</td>
<td>See DEECD</td>
</tr>
<tr>
<td>Education Victoria</td>
<td>See DEECD</td>
</tr>
</tbody>
</table>
Edumail

Edumail is the email system established by the Victorian Government for government schools. Each staff member is allocated a unique email address and associated password. Many schools also allocate school-based email addresses which may be preferred by teachers.

eLearning plan

Strategic document prepared by schools to guide the implementation of ICT integration across the school.

ePotential

DEECD initiative to promote ICT capacity building by teachers in Victorian government schools. Each year teachers are asked to complete an ePotential survey of their use of ICT. The ePotential tool generates a report to teachers showing where they sit on a continuum of ICT capabilities, and provides suggestions for how they might move along the continuum. The results link to online resources and professional development opportunities targeted to the individual teacher. Aggregated reports are available to school leaders to inform school professional learning agendas.

IWB

Interactive whiteboard

Laptop

Portable computer, see also notebook

laptop rollover

Teachers in Victorian Government schools are issued with their own laptop, for which they pay a co-contribution. Laptops are leased for a three year period, after which time they are replaced with a newer model, or ‘rolled over’.
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and Teaching Coaches</td>
<td>As part of a statewide initiative to improve learning and teaching in government schools, funding was made available to clusters of schools to engage experienced teachers to act as learning and teaching coaches to teachers in the areas of literacy, numeracy or ICT. Coaches would work with individual teachers within their cluster schools, providing one–to-one coaching as well as professional learning.</td>
</tr>
<tr>
<td>lifeworlds</td>
<td>This study uses the term lifeworld in the sociological sense of being the background environment of experiences culturally-grounded competences, practices, and attitudes that make up one’s cognitive horizons.</td>
</tr>
<tr>
<td>MESH</td>
<td>The name given to the integrated studies program at RiverValley Heights High School. Maths, English, Science and Humanities. The program was led by the Learning and Teaching Coaches.</td>
</tr>
<tr>
<td>MovieMaker</td>
<td>Video editing software</td>
</tr>
<tr>
<td>Netbook computers</td>
<td>Smaller, portable computers with smaller screens and processing capacity. These computers were significantly less expensive than full sized laptops.</td>
</tr>
<tr>
<td>Notebook</td>
<td>See Laptop.</td>
</tr>
<tr>
<td>Photostory</td>
<td>Specialized software application that allows the user to easily create a digital story, comprising still images, text and sound, in a video format.</td>
</tr>
<tr>
<td>Pods</td>
<td>Small to medium sized spaces, often located outside or between classrooms that generally</td>
</tr>
</tbody>
</table>
contain between 4-10 desktop computers. Unlike computer labs which need to be booked ahead by teachers and which generally involve whole classes, pods are designed for small numbers of students to make ad hoc use of the computers as the need arises. They are located adjacent to classrooms to enable ease of access and supervision.

Portables

Common name given to re-locatable classrooms. These are pre-fabricated buildings that are used by schools to accommodate additional students when enrolments exceed the space available within permanent buildings on the school campus. See also relocatables.

Portal

The name given to the intranet developed at RiverValley Heights High School.

PowerPoint

Presentation software

Practicum placement

As part of all teacher preparation programs, pre-service teachers undertake professional placement in schools. This is variously referred to as placement, practicum and teaching rounds, or combinations thereof.

Relocatables

See Portables

VCE

Victorian Certificate of Education is the certificate that the majority of students in Victoria receive on satisfactory completion of their secondary education

VELS

Victorian Essential Learning Standards Framework was the name given to the curriculum
framework that guided school curriculum for Years p-10, current at the time of the fieldwork for this study.

**VIT**

Victorian Institute of Teaching is a statutory authority for the regulation of the teaching profession in Victoria.

**VIT registration**

Graduating teachers in Victoria are awarded provisional registration upon graduating from their teacher preparation programs. They are then required to complete their full registration process within the first two years of teaching. The registration process includes written submissions providing evidence of the graduate teacher’s practices, and an assessment by a panel of peers.