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From Preservice Teacher Education to the Primary Classroom: An Investigation into Beginning Teachers' Experiences with Information and Communication Technology

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ABSTRACT

This thesis investigates the conditions that may help or hinder beginning primary teachers in using *information and communications technology* (ICT) in the classroom. A dearth of research exists on beginning teachers' experience and sense of readiness to use *ICT* for teaching and learning (and administration). Thus, there is limited knowledge of the challenges beginning teachers face and support they may benefit from to take advantage of the possibilities of ICT. The thesis sought to address this gap in the literature. It seeks to understand the experiences of eight beginning teachers from one New Zealand preservice teacher education institution during their first year of teaching.

An interpretative, qualitative methodology is employed to answer the overarching research question, which considers the nature of beginning teachers' experiences when they incorporate ICT into the teaching and learning process. Data were collected in 2005 using two main methods: a written questionnaire and two interviews—one a *photo-interview*.

The findings suggest the meaningful use of ICT requires beginning teachers to possess a high level of complex knowledge, including pedagogical content knowledge. They also highlight the importance of a supportive *school culture*, strong leadership and *induction* systems for beginning teachers' development. Notably, participants report relatively fragile conceptions of the potential of ICT for learning and lack knowledge of national and school policies in this area. Most of the beginning teachers were unable to make connections between their work as teachers and the broader policy goals for education. Although participants report they had limited opportunities to learn about

ICT during their *preservice teacher education*, they all wished they had been better prepared to utilise the potential of technology in schools.

Overall the study offers valuable insights into the experiences of a group of beginning teachers over their first year of teaching, which has implications for tutor teachers, principals, teacher educators and policy makers. Through a new line of research, the thesis reveals the complexity of learning to be an ICT-using teacher and the type of factors that contribute to teacher development. Although the thesis identifies a number of possible future initiatives, it concludes that more substantial research is needed from which generalisable findings may then be applied to beginning teachers, schools and the teacher education sector as a whole.

A postscript describes developments in the field since the fieldwork was carried out. It addresses the currency and contribution of this study to the field in light of the timeframe in which the original data were collected with reference to the stakeholders.

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TABLE OF CONTENTS

ABSTRACT.....	i
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS.....	iv
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
GLOSSARY OF ACRONYMS	ix
GLOSSARY OF TERMS.....	x
CHAPTER ONE: INTRODUCTION	
Introduction.....	1
Context	2
Debates about the Use of ICT in Schools.....	3
Definition of Key Terms	5
Research Problem.....	6
My Personal Journey.....	7
Structure of the Thesis.....	10
Chapter Summary.....	12
CHAPTER TWO: LITERATURE REVIEW	
Introduction.....	13
The Literature Search.....	14
Learning to be a Teacher	17
Learning to be an ICT-Using Teacher.....	25
Conceptions and Beliefs about ICT	29
Preservice Preparation and ICT	35
New Zealand Research on the Context for Beginning Teachers.....	47
New Zealand Research on ICT in Preservice Teacher Education.....	54
Chapter Summary.....	60
The Focus of the Research.....	62
CHAPTER THREE: THE RESEARCH PROCESS	
Introduction.....	65
Framing the Research Questions.....	66
Theoretical Framework	67
Ethical Considerations.....	78
Issues of Validity	81
Research Methods	83
Data Analysis Procedures.....	99

Presenting the Findings	101
Chapter Summary	102
CHAPTER FOUR: THE PARTICIPANTS	
Introduction	104
John	105
Lucy.....	107
Susan	108
Kay	109
Arnold.....	111
Annabel	112
Mary	114
Pam.....	115
Chapter Summary	116
CHAPTER FIVE: FINDINGS	
Introduction	118
Awareness of ICT Policy	119
Views on the Role of ICT in Schools.....	120
Beliefs about Schools' Expectations for ICT	124
Conceptions of ICT in Classroom Practice	126
School Culture and Mentoring.....	134
Experiences that Contributed to Self-Perceptions of ICT Competence.....	146
Reflection on ICT in Preservice Teacher Education.....	162
Chapter Summary	168
Overview of the Findings	171
CHAPTER SIX: DISCUSSION	
Introduction	173
Knowledge of ICT Policies for Schools.....	174
Understanding of ICT's Role in Teaching and Learning	176
Impact of the Work Environment	181
Factors that Influence Beginning Teachers' ICT Self-Efficacy Beliefs	186
Lessons for Preservice Teacher Preparation in ICT.....	192
Chapter Summary	197
CHAPTER SEVEN: CONCLUSION AND IMPLICATIONS	
Introduction	200
The Study.....	201
Reflecting on the Research Questions.....	202
Contribution of this Study	203
Limitations of this Study	204
Implications for Policy, Practice and Future Research	206
Final Thoughts	209
CHAPTER EIGHT: POSTSCRIPT	
Introduction	210
Recent Developments in Preservice Teacher Education.....	210

Recent Developments for Beginning Teaching, Mentoring and School Leadership.....	213
Recent Policy Developments and Research Reports on ICT.....	216
Recent Theoretical Developments in ICT	219
Concluding Statement	221
REFERENCES.....	223
APPENDICES	255

LIST OF TABLES

Table 3.1. The research process.....	68
Table 3.2. Composition of the participants' contexts in initial sample.....	91
Table 3.3. School type.....	91
Table 3.4. Number of students in participants' schools	92
Table 3.5. Final sample	93
Table 3.6. Data gathering timeline.....	94
Table 4.1. Participants' school and classroom contexts.....	105
Table 5.1. Participants' views about the role of ICT in schools.....	120
Table 5.2. Conceptions of ICT held by individual participants.....	127
Table 5.3. Access to computers, Internet and data projector.....	133
Table 5.4. Participants' reported experiences of support and mentoring.....	134
Table 5.5. Prior experiences with ICT	147
Table 5.6. Extent of ICT use modelled by lecturers and associate teachers ...	149
Table 5.7. Classroom ICT use during participants' practicum.....	151
Table 5.8. Self-assessed ICT skills and experiences at graduation.....	153

LIST OF FIGURES

Figure 3.1. Process of developing the sample	89
Figure 3.2. Process of collecting and analysing the data.....	94

GLOSSARY OF ACRONYMS

ERO	Education Review Office
Gen Y	‘Generation Y’ — young people born between the early 1980s and 2000, who are said to have grown up with technology, or, in the words of Tapscott (1996), have grown up as ‘digital natives.’
ICT	Information and Communication Technology
ISTE	International Society for Technology in Education
PCK	Pedagogical Content Knowledge
PRT	Provisionally registered teacher. The status of a beginning teacher during the first two years of teaching after graduation
TELA	Laptops for Teachers Scheme
TKI	Te Kete Ipurangi—A bilingual education portal which provides quality assured educational material for New Zealand teachers, school managers, and the wider education community.
TPCK <i>or</i> TPACK	Technological Pedagogical Content Knowledge <i>or</i> Technological, Pedagogical, and Content Knowledge

GLOSSARY OF TERMS

Associate teacher	A school-based co-operating teacher.
Advice and guidance programme	A jointly planned and documented programme of mentoring and professional development of a provisionally registered teacher guided by an experienced colleague—‘tutor teacher’—and which leads towards full teacher registration.
College of Education	A faculty of preservice teacher education within a university.
Contributing primary school	A school that caters for Year 0 (sometimes referred to as New Entrants) to Year 6 students, aged between 5 and 10 years.
Beginning teacher	Refers generally to a graduate in his or her two first years of teaching. This thesis has adopted the term ‘beginning teacher’ to signify newly qualified teachers in his or her first year of teaching.
Education Review Office (ERO)	A government department whose purpose is to evaluate and report publicly on the education of students in schools and early childhood centres.
e-learning	Learning and teaching that is facilitated by or supported through the innovative use of information and communication technologies.
Full primary school	A school that caters for Year 0 to Year 8 students, aged between 5 and 12 years.
Information and Communications Technology (ICT)	Technologies such as computers, software and peripherals. Includes the facilities and features for communication, digital cameras and other artefacts used in conjunction with a computer.
Intermediate school	A school that caters for students Year 7 and Year 8.
New Zealand Teachers Council	Formerly Teachers Council and Teachers Registration Board. An autonomous Crown entity. The regulatory body for registered teachers and the approval of preservice teacher education programmes.
Pākehā	A term used to describe non-indigenous New Zealanders.

Practicum	A preservice teachers' school-based teaching experience under the supervision of an experienced teacher—the 'associate teacher.'
Preservice teacher education	A teacher education programme that leads to provisional registration as a teacher.
School term	The school year in New Zealand runs from the beginning of February to mid-December and is divided into four terms.
Secondary school	A school that usually caters for students Year 9 to Year 13.
College	A secondary school that caters for students Year 7 to Year 13.
Teacher educator	A lecturer who teaches in a preservice teacher education programme.
Tutor teacher	A school-based mentor, usually an experienced teacher.
Web 2.0	A term used to describe a series applications on the World Wide Web that allows interactive experience in the form of blogs, wikis, forums, etc.

INTRODUCTION

CHAPTER ONE

INTRODUCTION

This first chapter outlines the development of this study of beginning teachers' use of ICT. It begins by discussing the policy context within which the thesis was conceptualised. This is followed by a summary of the nature of the debates about ICT in schools. It then defines three key terms. In outlining the research problem, the lack of empirical evidence about whether new teachers are adequately prepared to use ICT is noted. Next I describe my personal journey and motivation to examine the research problem. Lastly, I explain my orientation as an educator and as a researcher and briefly discuss the methodology of the research. The chapter concludes with an overview of the structure of the thesis.

The meaning of teachers' development is located in their personal and professional lives and in the policy and school settings in which they work. (Day, 1999, p. 1)

Introduction

This thesis investigates the conditions under which beginning teachers are expected to exploit the potential of information and communication technology (ICT) in the classroom. The term 'beginning teachers' is defined as graduated teachers in their first year of full-time employment. The research is grounded on the assumption that beginning teachers will play a key role in the education of the digital generation (Palfrey & Gasser, 2008). However, while it is often claimed that the teacher is central to student learning (Calderhead, 1996; Lai, 1999), relatively little is known about the adequacy of beginning teachers' preparation in ICT and their initial experiences with technology in schools. To address this gap in the literature this thesis reports a study of beginning teachers' dispositions, intentions and actions over the first year of their

INTRODUCTION

practice. It depicts their experiences over this time, and considers the personal and contextual issues that influence their development and ability to use ICT meaningfully within the curriculum. The study took place between 2005 and 2010 and the interview data were gathered in 2005.

Context

In 1998, the National Minister of Education, Rt Hon Wyatt Creech, launched the first ICT strategy for schools: *Interactive education: An information and communication technologies strategy for schools* (Ministry of Education, 1998). Since then, the use of ICT in schools has been promoted through a number of revised iterations of the original strategy, including the recent release of *Digital Horizons: Learning through ICT* (Ministry of Education, 2002). In concert with regular updates to the strategy, the Ministry has introduced a number of initiatives such as the ‘Laptops for Teachers’ Scheme’ (TELA), which subsidises the cost of computer hardware for teachers. A common goal of these Ministry initiatives is that teachers become competent at using ICT with their students in order to expand and strengthen their knowledge, skills and attitudes.

In 2002, the Labour Minister of Education reiterated this view in his speech to the Teacher Education Forum of Aotearoa New Zealand’s (TEFANZ) Annual Conference. He stated:

Three years from now I want to be confident that, as a sector, you are instilling in your students what is emerging from the work around literacy, suspension reduction, numeracy, assessment and ICT. (Mallard, 2002, para 41)

Clearly, ICT is seen as one of the key strands for fostering student learning. The New Zealand Teachers Council, the body responsible for teacher registration, expressed a similar point of view. The *Standards for Qualifications that lead to Teacher Registration* (Teachers Council, 2002) states that a satisfactory teacher’s “professional

INTRODUCTION

knowledge . . . is evident in the planning and preparation that goes into the teaching/learning programme . . . [and] demonstrates knowledge of . . . appropriate technology and resources” (p. 17). This statement is further evidence of the increasing formal expectations placed upon beginning teachers’ preparedness in the area of ICT.

Meanwhile, Chris France (2000a), as president of the New Zealand School Trustee Association, introduced a school governance discourse on ICT. He argued that beginning teachers do not understand ICT and its use in teaching and learning. He claimed that they have insufficient skills to use technology for their professional needs and that they do not have the pedagogical understanding of how to use technology for teaching and learning (France, 2000b). Although these claims may have widespread popular support, there is a dearth of New Zealand and international research on the confidence and competence of beginning teachers in the meaningful use of ICT in their classroom programmes. In other words, there is no solid evidence to support the lack of skills thesis, and arguments over teacher preparation distract from wider debate on the value of ICT use in schools.

The policy context described here relates to the period before 2005, when the fieldwork for this thesis was carried out. Developments subsequent to the fieldwork are noted in a postscript in the Conclusion chapter.

Debates about the Use of ICT in Schools

A complex and multifaceted debate has raged in the international literature for more than two decades. These debates have been over issues such as the proper role of ICT in education, the value of the investment in technology in schools and whether ICT ‘works.’ For example, a teacher-centred pedagogy has been pitted against a student-centred approach in a contest about which learning theory is most appropriate for ICT (see p. 32 for more detail).

INTRODUCTION

At the same time, advocates of technology present an optimistic perspective on its use in schools, based on the notions of progress as inevitable and faith in the effectiveness of ICT in schools, or in Selwyn's words, "technoromanticism" (Selwyn, 1999, p. 62). Criticism of this optimism comes from sceptics who question the place and relevance of ICT in schools, the neutrality of technology and the claim that technology does not necessarily mean progress (Willis, 2003). Willis asserts that these competing perspectives are ultimately driven by ideology.

Another perspective holds that such views are based on two paradigmatic conceptualisations of ICT: technological and social determinism (Selwyn, 1999). Technological determinism sees technology as the unproblematic driver of society, while social determinism is the belief that it is society that shapes technology. Social determinism is also at the root of the metaphor of ICT being just a tool and a neutral means to an end.

In many respects, the binary nature of this debate reflects a simplistic understanding of the role that ICT plays in the teaching and learning process. As Brown (2005) reminds us, "e-learning is neither demon nor panacea as such binary positions underestimate the complexity of the digital landscape" (p. 24). Above all, ICT in schools is not a single entity and much of the debate overlooks the significance of teachers and the educational context. That is to say, education is context-bound and ICT is always part of the wider learning culture. As Salomon (1990) points out by analogy, the music we enjoy is not produced by a single flute but rather from the sound of the whole orchestra.

The ICT debates have largely bypassed the New Zealand teacher and educational community. Typically, ICT is seen as an unproblematic tool (Brown, 2005). However, the harmful and beneficial effects of technology are not universal and generalisable as they are influenced by the context in which the technology is used. This thesis is based

INTRODUCTION

on the argument that there is a need to investigate the local conditions under which technology helps or hinders the learning and teaching process in particular circumstances. This study therefore bypasses the ICT debates as such. It focuses instead on classroom practice with ICT in the context of beginning teachers' work. This study attempts to gather insight into the conditions that influence the way beginning teachers conceptualise and use ICT. For example, it asks what impact school culture has on beginning teachers' meaningful use of ICT.

Definition of Key Terms

Having established the background to the study, three key terms need to be defined. Firstly, the term 'ICT' refers to the computer itself, its software and its peripherals, for example printer and scanner. This definition includes the facilities and features for communication, digital still and video cameras and other artefacts that are used in conjunction with a computer. Thus, the study adopts the standard definition of ICT as promoted by the Ministry of Education (1998). However, the terms 'ICT,' 'technology' and 'computer' are used interchangeably throughout the thesis, as this is consistent with common practice.

Secondly, in the literature the terms 'novice,' 'beginning teacher,' 'new teacher' and 'newly qualified teacher' are used interchangeably to describe teachers in their initial period of employment following their graduation. This thesis has adopted the term 'beginning teacher' to signify newly qualified teachers in their first year of teaching. They are the focus of this thesis.

Thirdly, throughout the literature the term 'integration' has been used to suggest that teachers should incorporate ICT seamlessly into the curriculum (for example, Dawes, 1999; Russell, Finger, & Russell, 2000). Although the concept of integration is poorly defined in the literature and no agreement exists on how to measure levels of

INTRODUCTION

integration (Proctor, Watson, & Finger, 2004), it is nonetheless seen as the gold standard for teachers' ICT use. In New Zealand, Ham (2002) tentatively suggested that integration may be related to teachers' curricular, temporal, spatial and pedagogical use of ICT. With this exception, little work has been done to articulate what integration might mean.

Another flaw in the integration concept is the assumption that teachers' current practice is appropriate and that they simply need to integrate technology within that. In this respect, the concept of integration can imply that ICT is merely an add-on to existing practice. A focus on ICT integration also has the risk of being counter-productive to understanding the more enduring dimensions of what it means to be a teacher, because a technocentric perspective—by which I mean a belief that is focussed on the technology—is more concerned with the machine than the learning process. For these reasons the term 'use' has been adopted to denote the many different ways teachers approach and experiment with incorporating ICT into their teaching repertoire and classroom practice. However, when the term 'integration' is encountered in this thesis, I use it in the sense of meaningful use of ICT.

Having defined three key concepts relevant to the thesis, the next section outlines the specific research problem.

Research Problem

Despite the expectation that preservice teacher education will prepare new teachers to use ICT, beginning teachers' use of computer technology in the classroom has not attracted the attention of the New Zealand research community. There is a lack of empirical evidence about their experiences with ICT and understanding of the personal and professional factors that contribute to the successful use of new technology in schools and classroom settings. Recently, the research community has shown a great

INTRODUCTION

deal of interest in beginning teachers. There is growing emphasis on the quality of advice and guidance programmes offered in the first few years of teaching (Education Review Office, 2004; Totterdell, Woodroffe, Bubb, & Hanrahan, 2004), but ICT is rarely mentioned. Beginning teachers are assumed to be ‘digital natives’ (Prensky, 2001, p. 2); that is, young people who have grown up with computers, digital information, the Internet and video games. Yet, we do not know if this perception is borne out in the reality of beginning teachers’ actual knowledge, skills and understandings about ICT for teaching and learning.

As stated earlier, there is limited evidence to support the argument that beginning teachers are prepared for the challenge of using ICT in the classroom, nor to suggest that they are not. Furthermore, there is a lack of information about the types of support and professional development available. Knowing more about the actual challenges beginning teachers experience when they use ICT in their classrooms will help to inform teacher preparation programmes and the support structures put in place in schools. This thesis seeks to address this gap in the literature about challenges beginning teachers experience when they use ICT. Thus, the overarching question this thesis sought to investigate was: “What are beginning teachers’ experiences when they incorporate ICT in the teaching and learning process in the classroom?”

My Personal Journey

As an educator, I cannot pretend to be detached. I have interests that influenced the way and the reason I selected my research topic and how I shaped the research questions. In this section I connect the reader to my background and experiences, and acknowledge the inherent subjectivity in the research design and interpretation of findings.

INTRODUCTION

I began my work in education as a primary teacher and became interested in using computers while a junior teacher in the early 1990s. A small article I wrote about my use of ICT with my young students was accepted for publication. Walking into the university for an appointment with the editor, I reconnected with the opportunities that resided within its walls. I began postgraduate study to develop a deeper understanding of educational philosophy, history and sociology. I wanted to be able to analyse and articulate my beliefs and understand myself better as an educator. When I came to choose a topic for my Master's thesis, I had been working with ICT use in educational settings within a university department. Although I was not involved in the preservice teacher education programme of the university, I was curious about the graduating preservice teachers' sense of preparedness to use ICT once they had a class of their own. Interviewing four preservice teachers in their final year of study for my Masterate led to findings that started me thinking more deeply about teacher education. It was puzzling that although these preservice teachers were politically aware and had strategic knowledge that enabled them to critically analyse the rationales underpinning government policy on ICT, none felt adequately prepared to use ICT in their future classrooms (Elliot, 2002).

Later, I became a teacher educator in ICT. I had concerns about the apparent lack of exploration of the affordances of technology to support curriculum studies in this preservice teacher education programme and the perceived low status of ICT within a number of the curriculum subject departments of the institution. I became interested in finding out how graduates from this programme would in reality use ICT as beginning teachers in their own classrooms. I also wondered what personal and contextual factors would contribute to, or hinder, their ability to consider pedagogy when teaching with ICT. The phenomenon I was interested in can best be described as first year teachers'

INTRODUCTION

experiences of coming to understand how learning happens in the classroom with the affordances of ICT.

My orientation as a researcher is grounded in my orientation as an educator. However, for this thesis my interest was in understanding and gaining insight into the personal, biographical and contextual factors that impact on beginning teachers' decisions about how and when to use ICT, and when not to. This suggested a qualitative approach as I was focussed on teachers' own stories and accounts of their experiences. Interpretivism was adopted as the theoretical perspective because of its usefulness when investigating people's experiences. Similarly I believe meaning grows out of social interactions and that research therefore places emphasis on and should explore the particular context and experiences of individuals. I thus selected a phenomenological methodology with its emphasis on seeking meaning while attempting to cast aside the constraints of culture. This was the framework I chose as most suitable for the research.

In taking a broadly qualitative approach to the study, I selected semi-structured interviews as the principal method of data gathering. A photo-interview component was incorporated into the second interview. I wanted the interview data at several points in time to capture the participants developing thinking and reflection on using ICT in their practice at more than one point in time. A questionnaire was used to obtain background information about the participants' prior knowledge of and experiences with ICT. The first interview mostly took place at the beginning of Term 2 of the New Zealand school year, 2005, and the second towards the end of Term 3, 2005.

The findings are presented in two chapters using a narrative form in order to give voice to the beginning teachers who took part in the study. In the first of these I describe my participants' biographical and contextual background as individual *portraits*, and in the second part I present the *findings* under seven themes that emerged from the analysis of the data.

INTRODUCTION

This research has been a journey of personal discovery as my knowledge has grown in the area and I have struggled to balance serious health problems with the demand of completing a thesis. My hope is that the thesis helps other educators in their own journey of discovery as we seek to understand the conditions under which ICT can be used to strengthen and enrich the learning and teaching process.

Structure of the Thesis

This thesis has eight chapters. The order and structure follow a conventional pattern. Chapter One—the current chapter—introduces the background to the study. Chapter Two is a review and critique of first the international and then the more limited New Zealand literature. The purpose of the chapter is to contextualise the study within the broader field of learning to be a teacher and establish what we know and do not know about beginning teachers' development with and without ICT. It identifies the major influences on beginning teachers' development as teachers. The focus then shifts to an examination of challenges in learning to be an ICT using teacher. Next I describe and critique the impact of preservice teacher education on beginning teachers' preparedness to use ICT. The chapter then explores conceptions and beliefs about technology before shifting to the New Zealand context for beginning teachers and their preservice education in ICT.

Chapter Three describes the research process used to carry out the research. First it frames and describes the research questions. It then explains the theoretical framework by explaining the epistemological underpinnings and characteristics of the qualitative approach chosen. The research methods and data collection procedures are described. The chapter next considers issues of research ethics. This is followed by a description of carrying out the data collection and the procedures used in analysing the data.

INTRODUCTION

Chapter Four presents an outline of the eight research participants' personal histories and school contexts. They are presented as portraits to contextualise and facilitate an understanding of the differences and similarities in the participants' backgrounds and teaching contexts. In doing so, each portrait seeks to draw attention to the individual's situatedness as a backdrop leading up to the presentation of the findings.

Chapter Five presents the results from the analysis of the data collected through a background questionnaire, a semi-structured interview and a photo-interview. Similarities, differences and patterns are identified and described thematically under seven headings: awareness of ICT policy; views on the role of technology in schools; beliefs about schools' expectations for ICT; concepts about technology in classroom practice; school culture and mentoring; experiences that contributed to self-perceptions of competence in ICT; and reflections on technology in their preservice teacher education.

Chapter Six moves on to a discussion of the findings in relation to the research questions and their significance with reference to the literature. The discussion takes place under the following headings, representing the five meta-themes: awareness of ICT policies for schools; understanding ICT's role in teaching and learning; the impact of conditions in the work environment on beginning teachers' development; factors that influence beginning teachers' self-efficacy beliefs about ICT; and lessons for preservice teacher preparation in ICT.

Chapter Seven reviews the study as a whole. It reflects on the degree to which the research questions have been answered and provides a summary of the key findings of the research. The study's contribution to our knowledge about beginning teachers and their use of ICT is considered. The chapter then identifies limitations of the study. Next, the implications of the research for policy, practice and further research are discussed. The chapter concludes with some final thoughts.

INTRODUCTION

Chapter eight describes developments in the field since the fieldwork was carried out. In doing so, it addresses the currency and contribution of this study to the field in light of the timeframe in which the original data were collected, and the extent to which the findings, implications and recommendations are still relevant and current for the stakeholders.

Chapter Summary

This first chapter has set the stage for this study of beginning teachers' experiences when using technology. It described the context in which the research topic is conceptualised and touched on the debate over the use of ICT in schools. Having defined some of the key terms, the chapter outlined the research problem, which is underpinned by a lack of empirical evidence about beginning teachers and their skills, knowledge and understanding of ICT. Next it described my personal journey and motivation to examine the research problem. In doing so, it established my orientation as an educator and as a researcher. The chapter concluded with an outline of the structure of the thesis.

Chapter Two, which follows, is a review and discussion of the international and New Zealand literature on learning to be a teacher, learning to be an ICT using teacher, beliefs and conceptions about technology and preservice teacher preparation in technology. It contextualises the study within the broader field of learning to be a teacher and identifies the major influences on beginning teachers' development as teachers generally and as ICT-using teachers particularly. The chapter also investigates and critiques the impact of preservice teacher education on beginning teachers' preparedness to use ICT. The literature review identifies what is known and not known about the research problem. It thus demonstrates the gap in our knowledge and provides the foundation for the research which this thesis seeks to begin to address.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews the international and New Zealand literature relevant to the topic of beginning teachers and their experiences with technology. It begins with an outline of the literature search process, which resulted in an abundance of research on ICT in teacher education but a paucity of research about beginning teachers' use of ICT. The chapter commences with a review of the international literature. This literature is discussed under six headings: learning to be a teacher; learning to be an ICT-using teacher; conceptions and beliefs about ICT; preservice preparation and ICT; New Zealand research on the school context for beginning teachers; and New Zealand research on ICT in preservice teacher education. The chapter draws to a close with a summary of what we can conclude from the review of the literature.

One reason teaching is a complex practice is that many of the problems a teacher must address to get students to learn occur simultaneously, not one after another. (Lampert, 2001, pp. 275-276)

Introduction

The use of ICT in primary schools has been the subject of considerable interest to education researchers in New Zealand and overseas. The extant body of literature is broad and ranges from teacher development in ICT to preservice teachers' preparedness in technology. This chapter reviews the literature relevant to beginning teacher development, beginning teachers' use of ICT and their preparation in technology in preservice teacher education. It also examines research on teachers' conceptions and beliefs about technology. The review has a tight focus. Specifically, it aims to locate the present study in the context of the international and New Zealand research literature

LITERATURE REVIEW

which has identified factors that influence beginning teachers' use of technology in their classrooms and their development as competent ICT-using primary teachers.

The literature review has seven parts. First, I explain the process of locating the relevant bodies of international and New Zealand literature. Second, I explore what it means to learn to be a teacher, based on the premise that teaching is a complex and deeply contextual process. Third, the literature review examines what it means to learn to be an ICT-using beginning teacher. I also consider the influence of preservice teacher education on beginning teachers' use of ICT. Fourth, I discuss conceptions and beliefs about ICT and their influence on how teachers use technology in teaching and learning. Fifth, I consider preservice teacher education and discuss the issues teacher educators face in preparing preservice teachers to become ICT-using teachers. Sixth, having discussed the international literature, I now move to the New Zealand literature. Here the review considers the research on the policy and practice context for beginning teachers. Seventh, given the paucity of research on beginning teachers' use of technology in New Zealand, I turn to the research on ICT in preservice teacher education. Lastly, the review provides a summary of the findings of this review and makes explicit the overarching question that arises as the focus of this research.

The Literature Search

A consideration of beginning teachers' use of ICT is underpinned by an understanding of the process of becoming a teacher. This was where I began the literature search. Next, I focused on the specific topic of this thesis: beginning teachers' use of ICT. I subsequently examined research on teachers' conceptions and beliefs about ICT. Lastly, I considered the literature on preservice teacher education, a period that unquestionably influences beginning teachers' thinking and action. I began with a search of the international literature, followed by a search of the New Zealand literature.

International literature searches

In the initial literature search on ‘becoming a teacher,’ the vastness of the literature soon became apparent. I approached this issue by constraining my search specifically to works from the last 25 years that linked directly to my research. Searches were made of the Massey University Library for books, education databases, relevant education journals, educational organisations’ websites and the World Wide Web (WWW).

I set out by conducting a search of the most widely used educational database, Education Resources Information Centre (ERIC), followed by the International ERIC database. If a database had a thesaurus function, I used it to establish appropriate descriptors for that database. From these searches, I developed a list of relevant search terms which I used depending on the particular source being searched (Appendix A). This also helped to determine the terminology that was most likely to produce worthwhile results in WWW searches.

I undertook a comprehensive search of pertinent international journals: for example Teaching and Teacher Education; British Journal of Educational Technology; Journal of Research on Computing in Education; Technology, Pedagogy and Education; and Journal of Research on Technology in Education. More general journals were also consulted, for example Review of Educational Research.

The outcome of my searches indicated that a great deal of international literature was found in some areas and little in others. To illustrate this wealth of literature, a search of the ERIC database using the search terms “Beginning Teachers” revealed 2096 results restricted to the years 1990 to 2004. In contrast, a search with the descriptors “Beginning Teachers” and “Educational Technology” gave just 29 results for the same period. When “Elementary Education” was added just one result was returned.

LITERATURE REVIEW

All relevant publications were recorded for further analysis in Endnote. It should be noted that the literature search had a strong United States and United Kingdom bias as relatively few European-based publications were reviewed. All publications were in English.

New Zealand Literature searches

For the New Zealand literature relevant to the thesis topic, I also searched Index New Zealand (INNZ), which indexes New Zealand education journals. I found only 16 relevant articles that examined a range of issues using the keywords “Beginning” and “Teachers.” A further limited search with the keywords “ICT” and “Beginning” and “Teachers” gave just one result. Although the abstract of the latter article contained the required keywords, the article in fact concerned preservice teacher education. It was a pattern I observed in other searches of both international and, to a greater extent, New Zealand literature. It should be noted that keywords used in the New Zealand literature are not always the same as in the international literature. For example, in the New Zealand context the acronym ‘ICT’ has been used since 1998 to denote what in the United States context is most often referred to as ‘educational technology.’

I made further searches of relevant government websites: for example the Ministry of Education, the New Zealand Council for Educational Research, the Education Review Office (ERO) and the New Zealand Teachers Council. These searches failed to identify studies that had examined the proposed area of study. Next, I consulted the bibliography *Education theses in New Zealand Libraries: 2000-2003*, which contained one relevant MA thesis, which I had already included. I also searched recent Teacher Education Forum of Aotearoa New Zealand (TEFANZ) and New Zealand Association for Research in Education (NZARE) conference proceedings and located four non-refereed papers. I found conference papers a useful source of information for the wider Australasian context. I also examined the reference section of

LITERATURE REVIEW

research reports and journal articles found in any of the searches. Lastly, because of the paucity of literature for the New Zealand context, I used personal and professional contacts to obtain references for the proposed area of research.

The exhaustive searches indicated that, to date, little empirical evidence exists in the area of beginning teachers' use of ICT in the New Zealand educational context. Thus, it was reasonable to infer from the outset that an investigation in this area would make an original contribution to the knowledge base of the field of ICT use in New Zealand schools.

The review of the literature is presented in two sections following my search strategies: first the international literature, followed by what we know about the New Zealand context for beginning teacher development. The international literature is discussed under four themes: learning to be a teacher, learning to be an ICT-using teacher, conceptions and beliefs about ICT, and preservice preparation and ICT.

Learning to be a Teacher

This section discusses two aspects of the literature on beginning teacher development that impact on learning to be a teacher. The influence of school culture on teacher development is considered first, followed by a discussion of the influence of mentoring on beginning teachers' development.

The beginning teaching experience has been extensively explored over several decades, particularly in the international literature. A dominant theme has been self-doubt, stress and other issues many beginning teachers experience. These challenges have been described with metaphors such as 'sink or swim' (Lortie, 2002; Varah, Theune, & Parker, 1986), 'reality shock' (Veenman, 1984), 'culture shock' (Wideen, Mayer-Smith, & Moon, 1998) and 'lost at sea' (Kauffman, Johnson, Kardos, Liu, &

Peske, 2002), suggesting that this period in a new teacher's professional life can be tumultuous.

When commencing work, the beginning teacher makes an epistemological shift from knowing about teaching in a supported environment to knowing how to teach through confronting the daily challenges in and out of the classroom as an independent professional (Feiman-Nemser, 2001a). This process builds on the foundation laid during the preservice teacher education and involves: (a) learning about the context—students, curriculum and school community; (b) developing responsive classroom programmes; (c) creating a classroom learning community; (d) enacting a beginning repertoire; and (e) developing a professional identity (adapted from Feiman-Nemser, p. 1050).

However, beginning teachers are different from graduates from most other professions in that they have the same basic teaching and classroom management responsibilities as their more experienced colleagues from the first day (Lortie, 2002). They must enact their knowledge about teaching and learning in the particular context and find and negotiate a place of their own within the existing school community (Kelchtermans & Ballet, 2002). Some of the factors that influence beginning teacher development are related to the school context: for example the school culture, collegiality, support from the principal and mentoring. Other factors such as self-efficacy (see p. 186) and beliefs relate to the beginning teachers themselves.

The influence of school culture on teacher development

The culture of a school has a major influence on a beginning teacher's development and learning. The term 'culture' has been described as 'slippery' (McMahon, 2004, p. 126). In the context of this thesis, I use Alvesson's broad definition of organisational culture, by viewing culture as: "A shared and learned world of experiences, meanings, values, and understandings which inform people and which are expressed, reproduced, and communicated partly in symbolic form" (1993, p. 3).

LITERATURE REVIEW

A beginning teacher has to get to know not only the students but also colleagues and how the school operates. One conceptualisation of this process is that the beginning teacher becomes part of a community of practice in which he or she learns and develops (Lave & Wenger, 1991). Parallels have been drawn with the tradition of apprenticeship, where the newcomer learns the meanings of colleagues' actions and how to reproduce them by actively participating in the community's activities (Clarke & Hollingsworth, 2002). In a school community, the new teacher must build relationships with colleagues and participate in their activities in order to learn. Likewise, colleagues must provide scaffolding for the new teachers while they learn and develop. This includes learning the "tacit understanding, inherent judgements and shared identity" (Duguid, 2003, p. 234).

Although the community of practice and apprenticeship models have contributed to our understanding of the process and conditions by which beginning teachers learn and develop, they fail to take into account inherent tensions. One tension is the lack of acknowledgement of the power differential between a newcomer and existing members of a community (Huzzard, 2004). Another concerns the reproduction of what may be conservative practices, thus reinforcing the status quo (Ball & Cohen, 1999).

A number of writers have pointed to the impact of collaborative cultures on teacher learning (Hargreaves, 1994; Williams, Prestage, & Bedward, 2001). Hargreaves linked collaboration and collegiality, which he argued bring teachers and curriculum development together. Other studies have highlighted the impact of collaborative and collegial cultures on beginning teacher development. For example, Kardos, Johnson, Peske, Kauffman, and Liu (2001) interviewed 50 first and second year teachers in a diverse range of schools in Massachusetts. Their qualitative study sought to understand what experiences beginning teachers had with their colleagues and within which organisational structures interactions took place. Their findings concluded that three

LITERATURE REVIEW

types of professional cultures could be conceptualised from the data: veteran-oriented, novice-oriented and integrated professional cultures.

In a veteran-oriented professional culture, the affairs and routines of the experienced teachers dominated, while a novice-oriented professional culture was encountered in new schools or where a disproportionate number of new teachers were employed. Although this professional culture was welcoming, enthusiastic and demonstrated vision, it lacked input from experienced colleagues.

In stark contrast, the integrated professional culture was inclusive and supportive. The experienced teachers across the school understood the importance of mentoring their new colleagues and talking about their work. The beginning teachers in the study by Kardos et al. (2001) reported that their development and learning was supported in an integrated professional culture; that their colleagues had an open-door policy; and that they could discuss student learning and how to improve their own practice in planned discussions. Notably, of the 20 beginning primary teachers in the sample, 13 described their professional culture as veteran-oriented.

Predictably, conditions in a beginning teacher's work environment can have positive as well as negative influences on their development. Day (1999) observed that some collegial relationships could best be described as 'comfortable cultures,' where issues dealt with were immediate and practical. He contended that teachers in such cultures did not engage in professional challenges. Moreover, Hargreaves (1994) argued that some collaborative and collegial cultures were contrived, compulsory and mandated by administrators. His research also found that secondary schools with an individualistic or "balkanised" culture—structurally divided into sub-groups—lacked collaboration and collegiality, both of which made school-wide collaboration difficult (Hargreaves, 1994, p. 18).

LITERATURE REVIEW

A number of researchers have noted that the leadership of the principal played a crucial role in facilitating innovative curriculum development, supportive relationships and collaboration as well as the intellectual character of the school (Flores, 2001; Marks & Printy, 2003). This finding was supported by Kardos et al. (2001). Their study also found that the principal in integrated professional cultures was actively involved in beginning teachers' development, was present and visible, took an interest in the beginning teachers, set clear expectations and high standards, invited them to discuss anything of concern, matched them with a senior teacher of the same level of the school as mentor, fostered collaboration, and had structures in place for their professional development. In contrast, the principal in veteran-oriented or novice-oriented professional cultures was absent, intimidating and monitoring rather than supportive of their professional practice. Beginning teachers were similarly unsupported in novice-oriented cultures, where the principal was present at times, regarded the beginning teachers as junior and subordinate, had a top-down leadership style, and seemed unconcerned about their professional practice.

The influence of mentoring on beginning teachers' development

Over the last few decades researchers and policy makers have taken an increasing interest in the support provided for beginning teachers. Several reasons for this are reported in the literature: for example, the high attrition rate for beginning teachers, who without adequate support and guidance are more likely to find the challenges of first year teaching so great that they decide to leave the profession altogether (Kelly, 2004). Another reason put forward has been the importance of the teacher to student learning (Darling-Hammond & Sykes, 2003; McNabb & Vandersall, 2002). It has therefore been deemed important to strengthen beginning teachers' professional development and learning opportunities (Weiss, 1999). Weiss went so far

LITERATURE REVIEW

as to state, “The ability of teachers' workplaces to support ongoing professional development will determine the future quality of education in our schools” (p. 861).

While the term ‘support’ has been used as an all-encompassing term for the assistance given to new teachers (Feiman-Nemser, 2001a), numerous studies have been specifically concerned with beginning teacher induction and mentoring. It should be noted that the terms ‘induction’ and ‘mentoring’ have been used almost interchangeably in the literature (Smith & Ingersoll, 2004). In this literature review I follow that practice. For clarification, Merriam-Webster (2004) defines induction and to induct as ‘an initial experience, initiation,’ and ‘to admit as a member, initiate, introduce,’ while mentoring is ‘to serve as a mentor for, tutor, coach,’ the mentor being ‘a trusted counsellor or guide.’

Feiman-Nemser (2001b) argues for a deeper understanding of the needs of beginning teachers. This was supported by Darling-Hammond and Sykes (2003), who suggest that a deeper and more complex teacher development could be facilitated by mentoring programmes where beginning teachers were provided with guidance and coaching from more experienced colleagues in a collaborative environment. Induction programmes mandated by specific jurisdictions have therefore been established in recent years as a strategy to improve beginning teacher quality.

In England, for example, a mandated one-year induction programme for all beginning teachers has been in effect since 1999. This induction programme consists of interviews with the beginning teacher, observations with feedback and collaboration with experienced colleagues. However, Tickle (2001) argued that the new induction programme was focussed on assessment to the detriment of professional development. He further asserted that “the standards adopted for assessing new teachers in England appear to derive from a minimal view of the role of the teacher” (Tickle, 2001, p. 53). That is to say, the standards represented too narrow a view of teaching practice.

LITERATURE REVIEW

A qualitative case study by Williams, Prestage and Bedward (2001) explored how the new mandated induction programme in England interacted with and influenced the cultures of the schools. They conducted two interviews with 18 teachers, 17 mentors and 11 heads of induction. The research took place in 11 rural and urban primary and secondary schools. The interviews took place early and late in the induction year. The data were analysed thematically. Williams et al. used Hargreaves' (1994) work on school cultures to explain the teachers' experiences. Although believing that the small sample size and specific circumstances made it difficult to generalise, they nevertheless put forward their findings that individualistic school cultures constrain beginning teachers' development. It does so by limiting their opportunity to talk, their interaction with colleagues and, in some cases, their access to professional development opportunities. In contrast, induction in cultures with a contrived collegiality, which Williams et al. call 'cultures of structural collaboration,' had a largely positive impact on the beginning teachers' development. This form of collaboration arose from the need to arrange regular reviews and observations with feedback, which, in effect, created a framework for collaboration with the beginning teacher. Lastly, the highest quality induction practice was experienced in collaborative cultures characterised by spontaneity, unpredictability and development-orientation.

The induction literature has paid relatively little attention to the critical dimension of teacher learning (Colley, 2002). Few studies have problematised issues of power and control, which are likely to be a major challenge for some beginning teachers. Often beginning teachers have been portrayed as powerless, to be shaped by the mentor as they are being socialised into the existing culture of the school. However, Gratch (2001) believed that beginning teachers' ability to form the necessary supportive relationships in new work environments depended not only on the school culture but their own ability to "negotiate the political terrain of teaching" (p. 121). Gratch

LITERATURE REVIEW

contended that teacher educators must ensure preservice teachers were prepared for the complexity of school cultures. They must understand that they had agency and could play an important role in shaping their professional development. To do so, they need to be able to assess external pressures through reflection and recognise the agentic moments that arise.

Kelchtermans and Ballet (2002) posited that every organisation had a micropolitical culture with subtle or not so subtle power relations between different members and groups within the organisation. This was the micropolitical reality that confronts beginning teachers. Members of an organisation used micropolitical strategies to meet their different needs and interests. Kelchtersman and Ballet stressed that individual members' use of power and control was not only associated with tension and conflict but also used in collaborative endeavours to achieve desired aims. The authors noted that micropolitics should be understood as a natural phenomenon in any organisation.

Hargreaves (1994) argued that the micropolitical dimension had been overshadowed by an emphasis on school culture. He contended that collaboration in some schools might take the form of co-option, where teachers might hold different values and reject the norm. Extending this idea, Kelchtersman and Ballet (2002) advocated for micropolitical literacy which, they asserted, had several components: knowledge that allowed one to read and interpret a situation; strategies that could be used to influence a situation and attain one's goal; and an experiential dimension where emotions of uncertainty, powerlessness and anger—or alternatively happiness and pleasure—were prompted by micropolitical encounters.

As discussed, induction experiences are not immune from misunderstandings and tensions (Colley, 2002). Positioning theory (Harré & Langenhove, 1998) can be used to examine and understand power and control in mentoring relationships. This

theory is an approach to reading and understanding the dynamics in discursive exchanges and institutional practices. It reveals how people are being positioned through these practices. Positioning theory replaces the static concept of 'role' with what is embodied in the word 'position.'

In the induction literature, Bullough and Draper (2004) used positioning theory to understand how a student teacher and her tutors positioned themselves and others discursively in their professional relationships to hold and maintain power. While this study examined the power relationship in a practicum setting involving three people, the theory holds much promise for understanding conflict in relationships. It aligns with the call by Gratch (2001) for preservice teachers to learn and practise the skills necessary to act in diverse school cultures to achieve their professional goals.

In conclusion, two key themes emerged from the literature on learning to be a teacher: the influence school culture exerts on beginning teachers' development and the importance of mentoring to their continuing development as teachers. I now turn to the literature on learning to be an ICT-using teacher.

Learning to be an ICT-Using Teacher

In spite of the high profile of ICT in education, there is only a limited literature on beginning teachers' experiences with ICT as they learn to become teachers. The gap in the literature is surprising given the educational research community's immense interest in ICT in preservice teacher education, as witnessed by the sheer number of studies. It should be noted that many studies that purport to report on beginning teachers' use of ICT are, in reality, mainly about either preservice or beginning teachers' reflections on their sense of preparedness to use ICT (Moursund & Bielefeldt, 1999), not the actual experiences of beginning teachers. This point underscores the importance of consistent terminology when referring to beginning teachers as discussed

in Chapter One. The lack of evidence about beginning teachers' experiences with ICT suggests that the efforts of teacher educators in preparing their preservice teachers to use ICT as classroom teachers is disconnected from the lived reality of beginning teachers' work (Strudler, McKinney, Jones, & Quinn, 1999). This disconnection strikes at the core of my thesis.

Research on beginning teachers' use of ICT

In reporting on the extant literature on beginning teachers and their ICT use, it should be noted that the affordances of ICT have increased and changed significantly over time, especially since the advent of the World Wide Web (WWW) a decade ago.

'Affordances' of ICT are used here as defined by Webb and Cox (2004, p. 238):

The affordances of the whole learning environment—teacher and students. At the representation stage in pedagogical reasoning process teachers need to decide what resources and approaches are likely to enable students to develop the particular skills and concepts on which they are focusing. They also need to be able to identify affordances on any suitable software and other resources for exploring and developing the ideas and skills that are to be taught. They then need to build these into lesson plans that involve activities in which they and the students also have roles in providing affordances.

At the same time the affordances of ICT in classrooms and for teachers' personal use have increased dramatically. For example, email is now used as a common means of communication and 'googling' is widely used to find information (Ferdig & Trammell, 2004).

Technical support was found to be an important issue for 211 beginning primary teachers in the United States when they were surveyed about their needs and concerns with ICT early in the school year (Strudler et al., 1999). The 98-item survey had a response rate of 35%. Forty percent rated the technical support for ICT 'poor' or 'none,' while nearly 39% rated their technical support 'good' or 'excellent.' Although this type of survey may be said to have methodological shortcomings, Strudler et al. argued that

LITERATURE REVIEW

without adequate support beginning teachers were unlikely to progress in learning to teach with ICT, even if they were well prepared.

It is often assumed that new teachers will know how to use ICT and that they are more comfortable with ICT than their more experienced colleagues. These issues were examined by Russell, Bebell, O'Dwyer, and O'Connell (2003) as part of a large-scale 3-year study: *Use, Support, and Effect of Instructional Technology (USEIT)*. The study involved 2,894 primary and secondary teachers in Massachusetts and used surveys to collect data. Russell, Bebell, et al. found that teachers with five years or less experience were more confident with ICT than their more experienced colleagues. New teachers also used email considerably more than their senior experienced colleagues and used ICT more for planning and preparation. Paradoxically, new teachers expected their students to use ICT less than did their colleagues in spite of having grown up with technology. One might speculate that knowing how to use ICT for personal and professional use and being comfortable doing so does not necessarily translate into new teachers using technology in the classroom.

Importantly, the two studies above could be characterised as technocentric in that they focussed on the significance of technology. Indeed, Strudler et al. (1999) went so far as to suggest that technical support and access to computers was the linchpin of teachers' ICT use.

A contrasting perspective was taken by Meskill, Mossop, diAngelo, and Pasquale (2002) in their research with five beginning teachers, two experienced ICT-using teachers and one experienced teacher who had never used technology. Meskill et al. used semi-structured interviews to gather data, while the beginning teachers also kept daily journals. The interview schedule prompted discussions about how and why these participants used a particular technology and how they conceptualised ICT use in their daily teaching and learning activities. Meskill et al. analysed and compared the

LITERATURE REVIEW

experienced teachers' discourse about ICT use with that of the beginning teachers. Four dimensions of teacher action and thinking emerged. They were: locus, focus, practice and emphasis. These dimensions were used to frame the findings. Each dimension comprised a continuum as follows: the *locus* dimension's continuum from being 'in the machine' to 'in learners,' the *focus* dimension from 'self' to 'student learning,' the *practice* dimension from managing students to empowering students, and the *emphasis* dimension from product to process (from Meskill et al., 2002, p. 49).

The findings showed conceptual differences in the actions and thinking of beginning versus experienced teachers when using ICT. For example, in the locus dimension novice teachers referred to the computer possessing agency and having the ability to teach. In contrast, the experienced teachers referred to the computer as a static object, conveying that the locus of learning was located in the learner. In fact, each continuum could be seen as a possible trajectory of the ICT use of many beginning teachers on their journey to become technology-using teachers. Meskill et al. (2002) acknowledged that beginning teachers worked in highly complex settings. They argued that the difference between beginning and experienced teachers was that experienced teachers had a broad array of craft knowledge and a conceptual understanding of teaching which they brought to bear on their ICT use.

A key finding of Meskill et al.'s (2002) study was the need for mentors and others who supported beginning teachers to facilitate opportunities where they could "learn to *see* and seize opportunities to observe, enact and support learning in highly complex social settings" [emphasis in the original] (Meskill et al., 2002, p. 54). Such assistance was premised on mentors and others having an increased awareness of how the conceptual observed differences were manifested through thought, action and speech.

LITERATURE REVIEW

This view was supported by Achinstein and Barrett (2004), who used the notion of reframing to illustrate the possibility of seeing issues from different perspectives.

Experienced mentor teachers, who were likely to have more complex schemata than a new teacher, could present multiple perspectives. To do so, Huling-Austen suggested:

Mentor teachers should be encouraged to explain the organization of their thinking in great detail to the novice teacher and to understand that the limited schemata that many novices possess will limit their ability to make inferences about students and classroom processes. (Huling-Austin, 1992, p. 176)

Beginning teachers, therefore, need mentors' reasoning, inferences and actions broken down and must be given many opportunities to practise if they are to develop.

In conclusion, four themes emerged from the literature of learning to be an ICT-using teacher: beginning teachers work in highly complex settings; they need mentors who are aware of the conceptual differences between the actions and thinking of beginning teachers and experienced teachers; they need opportunities to observe experienced colleagues and enact new insights with support; and they typically experience inadequate access to technology resources and technical support. In the next section I discuss the influence of conceptions and beliefs about ICT on how technology is used in schools.

Conceptions and Beliefs about ICT

Conceptions of the role of ICT in education strongly influence how it is used in schools (Drenoyianni & Selwood, 1998). Furthermore, a number of scholars (Ertmer, Addison, Lane, Ross, & Woods, 1999; Ertmer, Gopalakrishnan, & Ross, 2001; Gobbo & Girardi, 2001; Pierson, 2001; Ravitz, Becker, & Wong, 2000; Russell et al., 2003) have examined teachers' beliefs and their connection to pedagogical orientation when using ICT. Although much of this literature makes little or no distinction between opinions, perceptions and deep-seated beliefs, Russell, Bebell, et al. found that teachers' beliefs about ICT were the greatest predictor of technology use in the classroom.

Conceptions of ICT and their influence on how ICT is used

From his research on models of educational ICT policy adopted in countries around the world, Hawkrige (1990) proposed that four main rationales were used to justify and underpin the drive to use computers in schools: social, vocational, pedagogic and catalytic rationales.

Underlying the *social rationale* is the assumption that because computers are now part of contemporary life, schools should make sure children were unafraid of, and competent in, using them. This could be achieved by having ‘computer awareness’ programmes in schools. All students should have the skills to cope with the increased access to ICT. The *vocational rationale* was based on the notion of preparing children for the workplace, as all jobs in the market place would require some skill in computer use in the future. This could be achieved by an emphasis on learning how to operate computers, computer literacy and the ability to use common applications. The vocational rationale also implied that by teaching some programming in schools, students might choose a future career in computer science. The *pedagogical rationale* underpinned the assumption that ICT could support student learning across the curriculum. This involved schools having access to a bank of computers with Computer Assisted Learning (CAL) software programmes. The underlying belief was that computers can teach. The *catalytic rationale* was based on the belief that ICT could help change education and thus improve schools. ICT may therefore be seen as part of a reform agenda; computers may help make teaching and administration more effective. Hawkrige’s contention was that when computers were used in classrooms, teaching methods would change from teacher-centred and rote learning approaches to collaborative practice with children in charge of their own learning.

Hawkrige’s catalytic rationale has persisted. ICT has been widely accepted as a catalyst for educational reform. Paradoxically, it has been cast as having the potential

LITERATURE REVIEW

both to increase teacher and school effectiveness and to change teachers' classroom practices from a teacher-centred pedagogy to a student-centred one (Ferneding, 2003).

The pedagogical rationale has changed the most in the 24 years since Hawkrige's (1990) descriptions. The pedagogical rationale is today being used not only to justify the position that 'computers can teach' but also the opposite, that is to say, computers can support student learning in classrooms when the focus is on the learner, not the machine. In this second conceptualisation, the computer is seen as an inanimate object with no agency, the agency residing with the student (Meskill et al., 2002). However, agency lies also with the teacher, as indicated by the dominant metaphor used during the last decade: 'computer as tool' (Kozma, 2003).

In a small-scale study of English primary teachers' rationales and goals for ICT use, Drenoyianni and Selwood (1998) surveyed 50 teachers in three schools. The survey response rate was 60%. The authors subsequently interviewed 11 teachers, four of whom had completed the questionnaire, and followed this up with observation of six consenting teachers. These ICT-using teachers' years of experience ranged from one to 29 years. Using Hawkrige's (1990) rationales for computer use, Drenoyianni and Selwood's data analysis indicated that more than two thirds of the teachers embraced a combination of the social and vocational rationale as reason for ICT use. The authors called this the "computer awareness rationale" (Drenoyianni & Selwood, 1998, p. 91). Forty-three percent of those who responded to the questionnaire and 63% of those interviewed also supported the view that the role of ICT is to enhance student learning, thus expressing a pedagogical rationale. Some of the teachers therefore embraced multiple perspectives. Regarding teachers' educational goals for ICT, both the survey and the interview showed that nearly 90% held a computer awareness rationale. Nevertheless, the teachers also said that ICT could lead to collaborative learning, individualised learning and greater motivation, and could help in presenting new ideas

and improving basic skills. Ultimately, however, the goal of the teachers who held a computer awareness rationale was essentially to develop computer skills.

The mix of teachers' co-existing and competing conceptions of rationales for ICT is not surprising as at a macro level, it has been observed that different conceptions have been driving technology policy (Plomp, Anderson, Law, & Quale, 2003). Moreover, these divergent conceptions are not mutually exclusive.

Beliefs and their influence on how ICT is used

Two conceptualisations of pedagogical beliefs are often reported in the literature: teacher-centred (instructionist) and student-centred (constructivist). In a teacher-centred pedagogy the teacher is in control. Students listen to the teacher, who poses narrow questions. Investigations are simple and teacher-led (Maor & Taylor, 1995). In contrast, a student-centred philosophy holds that the teacher acts as a facilitator of student thinking, models the learning process by making the process of problem solving explicit, and coaches student actions. As self-directed learners, students design their own activities and share authority for answers (Anderson, 2002).

This binary distinction was given prominence in a large United States research project, *Teaching, Learning and Computing*, in the late 1990s (Becker, Wong, & Ravitz, 1998). Although such a simplistic dualism requires critique, many preservice teacher education institutions favour a student-centred teaching philosophy (Russell et al., 2003). Nevertheless, beginning teachers often tend towards a teacher-centred approach when they become immersed in the practical situations of the classroom (Cook, Smagorinsky, Fry, Konopak, & Moor, 2002). Other reasons cited for this paradox are the bureaucratic culture of the school and accountability and assessment regimes (Ravitz et al., 2000), as well as pressure from colleagues to conform (Burk & Fry, 1997).

LITERATURE REVIEW

Russell, Bebell, et al. (2003) similarly found that new teachers held strong student-centred beliefs about classroom practice, but that they at the same time agreed more strongly with teacher-centred practices. This dichotomy could not be adequately explained from the data. Suggested reasons given by Russell, Bebell, et al. were the combined effect of the pedagogical philosophy of new teachers' preservice teacher education programmes and their own experiences as students in teacher-centred classrooms. An alternative explanation was proposed by Ravitz et al. (2000), who suggested that respondents gave the answer they felt the researcher wanted.

According to Russell, Bebell, et al. (2003), their studies also revealed that new teachers were more likely than their experienced colleagues to believe that ICT can be harmful to student learning. The negative beliefs included the notion that technology made students lazier, reduced their research skills and made their writing worse. As Russell, Bebell, et al. conceded, this seemed paradoxical given that new teachers have grown up with technology and feel comfortable using ICT themselves. Meskill et al. (2002) reported similar views from their study of beginning teachers and how they use ICT. Their novice participants stated that students' use of technology made their work easy and demanded less effort.

Based on their review of the literature on the relationship between teachers' pedagogical beliefs and ICT use, Webb and Cox (2004, pp. 275-276) argue, "teachers' pedagogical reasoning . . . needs to become more complex in order to take advantage of the affordances provided by technology-based learning environments." They stress that teachers need to understand the link between their subject knowledge and the affordances of various ICT technologies. In selecting teaching strategies, teachers must go beyond mere presentation skills to topics and experiences that will challenge students' thinking and promote learning. They go on to say:

LITERATURE REVIEW

Teachers need to be aware of findings from these studies so that they can develop their expertise and explore ways of organising students when using ICT resources within the class: when students should work on their own, when to intervene and direct the learning, how working in pairs and groups should be organised and when to use ICT for whole-class teaching. Teachers need to know which kinds of class organisation will be most effective for the learning tasks, e.g. as individual/pair/group work or as a whole class. (Webb & Cox, 2004, p. 277)

Although Webb and Cox (2004) state what teachers need to know, they do not report how teachers will gain this knowledge. What they do say is that—according to their analysis of the literature—it is not easy for teachers to acquire and adopt the skills and dispositions that are needed for meaningful teaching with ICT. This view is supported by Blumenfeld, Krajcik, Marx and Soloway (1994), who argue that it takes time for teachers who are trying a new approach to recognise and discuss problems that stem from a conflict with their personal beliefs about teaching and learning.

Another point to consider is that the prevalence of the ‘tool’ metaphor implies that ICT has no influence on teachers’ beliefs (Monahan, 2004). This argument is supported by Waltz (2003), who claims, “Technology does not drive change so much as it resists it. Technology becomes a tool of maintenance, not innovation” (p. 376). The paradox is, therefore, that ICT can serve to reinforce traditional views of teaching while also supporting more contemporary approaches. Nevertheless, there is a dearth of literature on the way ICT itself actually influences teachers’ pre-existing beliefs.

In summary, four rationales used to justify ICT in schools were identified and discussed. I have considered teachers’ conceptions and beliefs about ICT and their influence on how technology is used. Teachers’ beliefs about ICT were found to be the greatest predictor for technology use in the classroom. Beginning teachers were seen to have strong student-centred beliefs about classroom practice but often tended towards a teacher-centred approach when immersed in the practical situations of the classroom. Beginning teachers were also more likely to believe that ICT could be harmful to student learning. In the following section, I move from a focus on becoming a teacher to

preservice preparation. Here I discuss four themes in regard to ICT in preservice teacher education: modelling, the practicum, pedagogical content knowledge and standards.

Preservice Preparation and ICT

In contrast to the paucity of international literature on beginning teachers' use of ICT, the literature on technology in preservice teacher education is prolific. This body of literature is concerned with the ongoing difficulties for teacher education in adapting preservice programmes to include ICT in a way that will enable new teachers to use it meaningfully. However, many of these studies are small in scale, investigate single cases or innovations, provide scant information about the methodology used or rely mainly on surveys.

The literature suggests that there are no easy answers to the question of how best to prepare future teachers in ICT. Rather, research to date suggests that solutions involve a "complex web of enabling factors" (Strudler & Wetzel, 1999, p. 63). Amongst factors that have received considerable attention in the literature are: modelling of ICT use by preservice lecturers, as college professors are known in New Zealand; the integration of technology within preservice programmes; the practicum; the relationship between pedagogical content knowledge and ICT; and standards. More recent literature also reports on system-wide changes within preservice programmes. I will next discuss each of these.

Modelling of ICT and its integration within preservice programmes

ICT and teacher education have taken separate paths in preservice teacher education (Willis & Mehlinger, 1996). Historically, preservice teachers have learnt about technology in stand-alone courses that were isolated from the rest of their preservice programme. Willis and Mehlinger asserted that preservice teachers need to see technology use modelled in their courses, need opportunities to make connection

LITERATURE REVIEW

between ICT and their subjects and class level, need to see experienced teachers use technology in the classroom, and need to use ICT themselves while on practicum under the guidance of an experienced ICT-using associate teacher.

A large survey of ICT in teacher education in the United States commissioned by the International Society for Technology in Education (ISTE), (Moursund & Bielefeldt, 1999) confirmed these assertions. Four important factors in the preparation of new teachers in ICT were identified: access to technology facilities, integration of technology in preservice education, preservice teachers' ICT skills, and practicum experiences with technology. Furthermore, Moursund and Bielefeldt acknowledged that in most teacher education programmes lecturers do not model the use of ICT in their courses. These claims were not new. A report by the National Council for Accreditation of Teacher Education (NCATE) (1997) pointed out that preservice programmes lacked ICT equipment and infrastructure; teacher educators did not have access to adequate professional development and lacked technical support; the programmes had not kept abreast of changes in ICT in schools; and teacher education programmes rewarded individuality, not collaboration.

Many teacher educators are not themselves experienced technology users. In fact, it has been argued that teacher educators' technology skills are similar to those of their preservice students (Moursund & Bielefeldt, 1999) and that their lack of knowledge about ICT is a barrier to preservice students' learning (Willis & Mehlinger, 1996). More recently, the literature has reported on endeavours in programme-wide integration of ICT (Pierson & McNeil, 2000; Strudler, Archambault, Bendixen, Anderson, & Weiss, 2003; Strudler & Wetzel, 1999; Vannatta & Beyerbach, 2000).

Technology integration in preservice education has been described as teacher educators using ICT strategies in their curriculum and subject courses (Pierson & McNeil, 2000); that is to say, teacher educators model what they expect from their

LITERATURE REVIEW

preservice students (Pope, Hare, & Howard, 2002). In a study in the United States, Pope et al. investigated whether preservice lecturers' modelling of ICT strategies in subject courses made their preservice students feel more confident when using technology in the classroom. Over 11 weeks, 26 self-selected preservice teachers participated in a 2-hour weekly course in ICT skills and a 2-hour weekly course on technology integration in four subject areas. Participants were asked to fill in a 'Technology Proficiency and Confidence Level' survey as both a pre-test and a post-test. The findings were that lecturers' modelling of ICT integration strategies in subject courses increased preservice students' level of confidence.

A contrasting finding is reported by Taylor (2004). In her study of how preservice teachers in the United Kingdom develop their understanding of using technology for teaching and learning, she found no evidence that teacher educators' modelling of ICT contributed to preservice teachers' knowledge. Her findings showed that it was classroom experience that was central to their learning. Taylor also made the observation that if preservice teachers' ideas about teaching and learning do not keep pace with their technology learning, they may end up concentrating on the technical aspects of using technology.

While the literature on ICT integration is mainly focussed on improving teacher education programmes (Strudler et al., 2003), some studies have examined the integration of ICT in preservice teacher preparation through collaborative relationships. In the United States these relationships have to a large extent become possible through a government initiative intended to develop ICT capacity in teacher education, *Preparing Tomorrow's Teachers to use Technology* or PT3. Davis (2003), for example, described five teacher education programmes which provided professional development in schools that offered practicum experiences. One of these programmes adopted a strategy in which a preservice teacher was paired with an associate teacher. They

LITERATURE REVIEW

worked together to identify and implement ICT in the classroom programme with support from a graduate student. Davis emphasised that while successful, this form of innovation in teacher education is complex and that coherent planning across institutions is difficult to achieve on a continuing basis.

Strudler, Archambault, Bendixen, Anderson and Weiss (2003) evaluated another *Preparing Tomorrow's Teachers to use Technology* (PT3) project which combined a variety of preservice learning opportunities intended “to bring about systemic change by building the capacity of individuals and institutional structures” (p. 54). Their model identified enabling factors at the programme level, for example collaborative planning and professional development. Another factor was practicum experiences with an experienced ICT-using associate teacher, which were found to influence preservice teachers' attitude, knowledge, skills and leadership. One limitation of their model was the acknowledgement that some teacher educators are reluctant to relinquish their autonomy in what and how they teach.

This section has discussed the effect of modelling technology use and the integration of ICT into teacher education programmes. This began with early attempts to prepare preservice teachers to use ICT using a single, stand-alone course model. Increasingly, the challenge has become one of integrating ICT strategies into subject studies and education courses. Later developments have included collaborative efforts with practicum schools. In the next section, I turn to the practicum, where preservice teachers experience teaching and learning in authentic classroom contexts under the guidance of an experienced teacher.

The practicum

Preservice teachers have opportunities to learn in a classroom setting under the guidance of an experienced teacher during their practicum—also known as field experience. Here preservice teachers have the opportunity to test their developing

LITERATURE REVIEW

pedagogical understandings, content knowledge and teaching repertoire offered in their preservice programme. As mentioned earlier, the practicum is seen by some as the most important component in preservice education (Strudler et al., 1999). From an ICT point of view, preservice teachers would ideally be placed in the classrooms of experienced technology-using teachers, where they can learn from hands-on experiences and see the impact of ICT use on student learning (2004). This is not always possible, because experienced technology-using teachers are still not commonplace in schools (Russell et al., 2003; Strudler & Wetzel, 1999).

It has been argued that if associate teachers lack technology skills, they might send the wrong signals and influence preservice teachers not to use ICT (Willis & de Montes, 2002). In contrast, other researchers suggest that preservice teachers might find classroom modelling of even poor ICT use valuable (Taylor, 2004). Other scholars lament: the lack of models available during the practicum (Dexter & Riedel, 2003; Goos, 2004); that associate teachers cannot advise on ICT (Moursund & Bielefeldt, 1999); that preservice teachers do not observe students using technology (Jones, 2002); and that what use children do make of technology is trivial (Keating & Evans, 2001).

Several studies have investigated the intensified efforts by preservice teacher educators to enhance learning opportunities during the practicum. Dexter and Riedel (2003) reported on the impact of the implementation of a “content area-specific approach” (p. 335) to ICT in two institution-wide interventions in the United States. This programme was designed to flow from a single required ICT course to integration of technology into subject study courses and on to practicum experiences. A constructivist model of learning underpinned the project, premised on the notion that the preservice students needed opportunities to actively construct their own knowledge of pedagogical content knowledge and to link this to their prior knowledge. Lecturers were expected to model and discuss at least some ICT use and suggest ways to include

LITERATURE REVIEW

technology in the students' teaching plans. The project team provided suitable assignments, exemplars and software to lecturers for the individual courses they taught. More ICT resources were also made available in the classrooms in the preservice institution. Notably, the project interventions occurred within the programme components over which the institution had control. The interventions consisted of two components: coursework, where preservice students learnt how to use ICT and how to use it in teaching and learning, and setting clear expectations that the preservice teachers would demonstrate that they could use technology in the classroom context during their practicum.

Data collection in this study by Dexter and Riedel (2003) consisted of an 89-item survey. The participants were two cohorts of preservice students in both primary and secondary programmes in 2000 and 2001, totalling 389 students. The survey took place after their practicum and had a response rate of 51.4% ($n = 201$). It consisted of a number of sections intended to gauge the success of the interventions; that is, the degree to which preparation for using technology was effective and whether their expectations of using technology on practicum were fulfilled. The survey also sought information about the school context, for example access to ICT equipment and support over which the preservice institution had no control.

The findings showed that most of the preservice teachers reported their skills and comfort with ICT to be 'comfortable,' 'somewhat comfortable' or 'expert.' The findings also indicated that the school ICT context influenced whether or not the preservice teachers used technology during their practicum. For example, 30% indicated that they were neither required nor expected to use technology, 39.5% were encouraged to use technology, while 28.5% were required to do so. Dexter and Riedel found two predictors for preservice teachers' ICT use and frequency of use while on practicum: the associate teacher or preservice programme lecturer's expectation that they would use

LITERATURE REVIEW

ICT, and the availability of technology in the classroom. Another finding was that if preservice teachers used technology only infrequently, so did their students. However, if preservice teachers used ICT frequently, it did not follow that their students did. Lastly, when asked if the associate teacher modelled and used technology frequently in an integrated manner and thus inspired the preservice teacher to use ICT, the most common response was to strongly disagree.

Dexter and Riedel (2003) identified three key factors that they believe make a difference to preservice teachers' preparedness in ICT: teacher education programmes must ensure preservice teachers have adequate opportunity in their courses to learn to integrate ICT if they are expected to use it; teacher educators must select practicum schools purposefully to ensure a sufficient level of access to ICT or, for example, provide technology equipment that can be borrowed for use during the practicum. And, they must provide better support for students while on practicum, for example by collaborating with associate teachers and using computer-mediated communication such as email.

While there is universal agreement that the practicum is vital in the education of preservice teachers, Dexter and Riedel (2003) highlight the fact that schools and teacher education institutions exist for different purposes, with the latter being more dependent on the former than vice versa. Strudler and Wetzel (1999) provide a case in point in their study of four exemplary teacher education institutions in the United States. Most preservice teachers from two of these institutions had at least one practicum in an ICT-rich classroom in the laboratory schools¹ affiliated with the institutions, over which they had some control. In contrast, practicum placements in ICT-rich classrooms in surrounding public schools were much more difficult. Some classroom teachers in these

¹ Laboratory schools are model schools affiliated to teacher education institutions. One of their functions is to provide practicum opportunities for preservice teachers.

public schools found it an imposition to be expected to use technology, which in turn caused a backlash against the teacher education institution.

Another strategy that supports preservice teachers getting the most out of their practicum is reported by Strudler and Wetzel (1999). Preservice teachers were asked to make an informal inventory of technology equipment available in the school in their first week on practicum, to talk to the teachers in the school about their philosophy of teaching with technology, and to ask them whether ICT was used for games or used in teaching and learning. This context for technology use was then discussed in the preservice class back at their institution. Lecturers were then able to set individualised assignments that focussed on ICT for students' practicums to suit the particular context.

The preceding studies have been concerned with 'getting ICT into teacher education' but have not addressed the fundamental issue of pedagogical content knowledge (Shulman, 1986) and ICT. I now turn to the small body of literature concerned with this.

Pedagogical content knowledge and ICT

The concept of pedagogical content knowledge builds on the seminal work by Shulman (1986, 1987) concerning teacher knowledge, what it is, how it is acquired and how it is instantiated. Shulman describes pedagogical content knowledge as follows:

The particular form of content knowledge that embodies the aspects of content most germane to its teachability. . . . the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations—in a word, the ways of representing and formulating the subject that makes it comprehensible to others. (1986, p. 9)

It is within this frame of reference that a preservice teacher will learn to discern the affordances of ICT and “to transform the content knowledge he or she possesses into forms that are pedagogically powerful” (1987, p. 15), whether this involves technology or not. One could argue that such teacher knowledge takes time to develop.

LITERATURE REVIEW

However, the point is that alongside learning content knowledge, pedagogical knowledge and the associated teaching strategies, ICT knowledge relevant to these understandings and strategies should be included.

Keating and Evans (2001) called the intersection of teachers' pedagogical knowledge and ICT use 'technological pedagogical content knowledge' or TPCK. While teaching a preservice course on transforming the classroom with ICT, they were frequently puzzled by their students' mindset of "the '3 or 4 computers at the back of the room' model of ICT" (Keating & Evans, 2001, p. 1674). This model demonstrated the breadth of the preservice teachers' understanding of technology use in the classroom. They therefore introduced a more complex and critical view of technology into their course and argue, "Students should be engaged in thinking about how technology can be integrated into the various learning strategies to which they have been exposed in Schools of Education" (Keating & Evans, 2001, p. 1674). They noted that some of the preservice teachers formed their views of pedagogical content knowledge in opposition to what they saw modelled on practicum, a view supported by Taylor as stated earlier (2004). In their course, Keating and Evans were unable to place their students on practicum with experienced associate teachers with a high level of TPCK. In this respect, their course did not differ from most other teacher education programmes (Dexter & Riedel, 2003).

A case study by Margerum-Leys and Marx (2004) investigated what knowledge of ICT we can infer from observing and talking to a preservice teacher and an associate teacher about how they acquire, use and share knowledge of ICT. Their case study was set in a middle school of students between 11 and 14 years in the United States. The study followed the evolving relationship between a preservice teacher and her associate science teacher over a 3-month practicum. The depiction of the teachers' ICT knowledge was informed by Shulman's (1987) model of teachers' knowledge and

comprised content knowledge, pedagogical knowledge and pedagogical content knowledge of ICT. Both participants were keen users of ICT and incorporated technology in their everyday teaching. Their relationship lent itself to team teaching. ICT knowledge was shared through their joint use of curriculum resources and by working together when implementing new activities. The preservice teacher, therefore, experienced “firsthand what the pedagogical issues were and to increase her own pedagogical and pedagogical content knowledge of ICT” (Margerum-Leys & Marx, 2004, p. 431).

To date there has been relatively little recognition of the specialist nature of ICT pedagogical content knowledge and this is a fruitful area for further research. Next, I discuss and critique the standards movement and its influence on teacher education, predominantly in the United States and the United Kingdom.

ICT standards and their influence on teacher education

In many countries, teacher education programmes are approved by national or state bodies that oversee the accreditation and licensure or registration of teachers. In response to perceived concerns over the educational achievement of students (Delandshere & Petrosky, 2004; National Commission on Excellence in Education, 1983), a movement to reform education emerged in the 1980s in many parts of the world (Delandshere & Petrosky, 2004). ICT was seen as one area where improving student achievement was particularly important. At the same time, research showed that new teachers were ill-prepared to use ICT (Moursund & Bielefeldt, 1999). As a result, the focus of attention fell on teacher education and the preparation of teachers.

Initiatives on standards for ICT for preservice teachers have been met with some enthusiasm in the United States and United Kingdom. In the United States, a set of national ICT standards for teachers was developed by a non-governmental group comprising educational administrative organisations, subject and curriculum

LITERATURE REVIEW

organisations, and computer and telecommunications companies (International Society for Technology in Education, 2000). By 2004, 34 states had adopted the ISTE standards for their teacher education programmes (2004). They were to be used alongside the accreditation standards for curriculum, content and assessment developed by National Council for Accreditation of Teacher Education (NCATE). The ICT standards were detailed and required preservice teachers to demonstrate ICT knowledge and skills in six categories with a total of 23 performance indicators. Portfolio assessment—assessment based on a collection of students’ work—was introduced to demonstrate not only preservice teacher learning but also change in their learning over time. The ICT standards for teachers match the ICT standards which ISTE developed for students and administrators with the intention to form a seamless and fully aligned system.

It has been argued that ISTE as an organisation is “proconstructivist, protechnicist, and proactively promoting their conceptual convergence” (Robertson, 2003, p. 292). The way the ICT standards are formulated gives some validity to this claim. For example, the indicators require teachers to demonstrate that they can “use technology to support learner-centered strategies” and “apply technology-enhanced instructional activities” (ISTE, 2000, n.p.). Learner-centred or constructivist pedagogy has for some time been privileged in the discourse on ICT. However, we are reminded that no single teaching strategy can define the best way to teach (Keating & Evans, 2001). ISTE’s ICT standards may be seen as detailed and prescriptive or, as Delandshere and Petrosky argue, “fragmented and atomistic” (2004, p. 12).

Amongst Delandshere and Petrosky’s (2004) concerns were that new teachers’ understandings of teaching and learning would be as fragmented as the standards themselves. This was seen in their study of preservice teachers’ portfolios which examined the quality of the evidence the portfolios presented and the inferences that were made from them. They concluded that the portfolio evidence the preservice

LITERATURE REVIEW

students provided was in direct response to the standards and the list of behaviours they were to demonstrate. As a consequence, Delandshere and Petrosky argued, the portfolios lacked any evidence of their understanding of teaching. This focus on the standards and accreditation defined not only what the lecturers taught but also how they and their students planned, thought and talked about teaching and learning.

Furthermore, it made invisible the deterministic assumptions and ideological policies on which the use of ICT in schools was based. Teacher educators must therefore “adopt a stance towards ICT in the classroom that deliberately exposes its underbelly” (Robertson, 2003, p. 293). However, as Delandshere and Petrosky observed, teachers can only challenge the ideological bases of ICT and the standards if they know they exist.

In England, the National Curriculum and preservice teacher education programme requirements are closely matched in a “seamless web of specification” (Cohen, Manion, & Morrison, 2004, p. 27). Teacher education programmes must therefore be closely linked to the standards that encompass the knowledge and skills needed to teach in the National Curriculum. ICT is a subject or learning area in its own right and is required to be included in curriculum activities. Preservice teachers must demonstrate that they meet the required skills, knowledge and understandings to be recommended for the Qualified Teacher Status (QTS) at the end of their preservice teacher education. These graduation requirements are organised into three areas of teaching competence with a combined total of 42 standards. ICT is singled out as a subject area in the standards. For example, in the ‘Knowledge and understanding’ area, preservice teachers must “demonstrate that they know how to use ICT effectively, both to teach their subject and to support their wider professional role” (Standard S2.5) (Teacher Training Agency, 2003, p. 9). Graduates are also required to pass an online test of their ICT skills. The standards are then reflected in the specifications of the

LITERATURE REVIEW

National Curriculum, where students must be given the opportunity to learn to use and apply ICT tools in each strand of the curriculum to support their learning.

Performance indicators have been criticised as representing “idealized views” of preservice teachers’ capabilities (Delandshere & Petrosky, 2004, p. 6). Furthermore, compliance with these bureaucratic demands becomes part of preservice students’ understanding of teaching (Delandshere & Petrosky, 2004) by limiting the messages they receive (Ginsberg & Clift, 1990). The “multiplicity of standards” introduced by the reforms has been criticised for making teaching very difficult, especially for preservice and beginning teachers (Delandshere & Petrosky, p. 3). Delandshere and Petrosky paint a picture of preservice teachers on practicum trying to please everyone by simultaneously considering students’ standards in all curriculum areas, their own standards as teachers for the level being taught; and the guidance from their preservice lecturers, who are charged with their accreditation.

In summary, standards for ICT have so far been developed and adopted in the United States and United Kingdom. Some of the key issues in the debate about standards were considered and the objections to standards noted. So far, New Zealand and Australia have not adopted standards for ICT for teacher accreditation.

To conclude this section, four themes have been discussed in regard to ICT in preservice teacher education: modelling, the practicum, pedagogical content knowledge and standards. The following section discusses the New Zealand literature on the context for beginning teaching. First, it examines teacher registration and induction policy and procedures. Second, it reviews the limited literature on beginning teaching.

New Zealand Research on the Context for Beginning Teachers

I now turn to the New Zealand literature. There is a dearth of literature on beginning teachers’ use of ICT amongst the relatively few published studies in this area

of beginning teaching. While a number of studies purport to investigate beginning teaching, they are in reality concerned with the preservice period. I begin this section by explaining the policy context for teacher registration and how the policy is reported to work in practice as far as induction is concerned. I then move to studies on learning to be a teacher.

Teacher registration and induction policy and practice in New Zealand

The New Zealand Teachers Council is responsible for approving teacher education programmes and the registration of teachers. Graduates from a Council-approved programme are provisionally registered as teachers for a period of two years. During the period of initial employment, beginning teachers are required to undergo a programme of mentoring, also called ‘advice and guidance programme’ (Teachers Council, 2002). An experienced mentor teacher, usually referred to as the ‘tutor teacher’, supervises the programme. The beginning teacher and tutor teacher jointly plan a suitable programme of intensive professional learning that will lead to full registration. The beginning teacher and tutor teacher maintain a written record of this programme, to be used as evidence when the beginning teacher applies for full teacher registration. The beginning teacher’s professional learning is also linked to the school’s general teacher appraisal system. The principal recommends the beginning teacher for full registration based on the written evidence and the appraisal, confirming that the beginning teacher meets the “Satisfactory Teacher Dimensions” (Appendix B) as well as the “Fit to be a Teacher” criteria (Appendix C).

A beginning teacher’s employing school is entitled to additional funding of a 0.2 time allowance in the first year of provisional registration and 0.1 in the second. This is intended to free up time for the beginning and tutor teacher to implement the required advice and guidance programme. The time allowance may be used for a variety of purposes, for example meeting other beginning teachers, observing another teacher or

LITERATURE REVIEW

being observed with follow-up feedback, and participating in professional development courses and meetings (Teacher Registration Board, 1997).

Grudnoff and Tuck (2002) observed that preservice teachers abruptly terminate ties with preservice programmes once they graduate. This is despite initial teacher education being conceptualised as a five-year continuum from beginning preservice education to the end of the two years of provisional registration. The Ministry of Education-funded School Support Services, based in the university and attached to colleges or faculties of education, are funded to support beginning teachers. However, typically no prior relationship exists between a preservice programme and School Support Services. Without this continuity, it is difficult to see how the School Support Services can effectively provide for the needs of new teachers. This view is supported by Lang (2001) in her study of seven beginning teachers and their survival experiences over the first year of teaching. She argues that induction courses for beginning teachers held by School Support Services are based on trial and error and do not adequately take into account what is known about the struggles of beginning teachers as reported in the literature. Renwick (2001) similarly suggests that preservice teacher education and schools could work more closely to provide a continuation in the preparation of teachers.

A national study on the quality of induction of beginning teachers in their second year of teaching was carried out by Education Review Office (ERO) (2004). They posited that the level of subject knowledge necessary to teach effectively, the degree to which students were engaged in their learning, and how well the school facilitated the beginning teachers' professional development, would demonstrate the effectiveness of the induction. The study's sample consisted of 119 beginning teachers from 79 primary schools and 79 from 32 secondary schools. The participants all taught in the same school as they did in their first year of teaching. A survey was distributed to the

LITERATURE REVIEW

participants in advance to collect demographic data and reflections on their first year of teaching. Data gathering, which took place in conjunction with ERO's school reviews, consisted of: classroom observations; reviewing documentation; information from the school review; and interviews with the beginning teacher, tutor teacher and principal or senior manager. The findings were that 65% of the primary teachers met or exceeded ERO's expectations for effectiveness, while 71% of the beginning teachers' advice and guidance programmes exceeded the expected effectiveness. Fewer than 20% of primary schools were found to be less than effective in regard to the beginning teachers' teaching and the schools' induction support. ERO made three particular observations of schools where the beginning teachers were doing well: they had strong school support from colleagues; the relationship between the beginning teacher and tutor teacher was positive; and schools with several beginning teachers did better. Recommendations included providing professional development for tutor teachers, increasing professional development opportunities for the beginning teacher, and establishing a beginning teacher support network.

ERO's findings may be critiqued on several points. First, 'effectiveness' and 'quality' are contested terms. Nash argues, for example, "The belief that effective teaching can raise the performance of students to a marked extent seems to have become fixed in the contemporary discourse of educational policymakers" (Nash, 2004, p. 42). Second, in relation to beginning teacher induction, Tickle comments that the quest for ways to define teaching standards and assess professional competence have escalated in recent times to a search for a "holy standards grail" (Tickle, 2001, p. 53). Notwithstanding these and other criticisms, the literature overwhelmingly stresses the importance of beginning teacher induction and the need to improve the advice and guidance induction programme in some New Zealand schools.

LITERATURE REVIEW

The literature suggests that the character of the advice and guidance programme may be as critical to beginning teacher induction as are school culture and organisation. Lovett and Sinclair's (2004) case study described the induction experiences of two beginning teachers, whose experiences contrasted starkly as a result of contextual differences. One teacher was employed in a large school with an integrated professional culture, while the other was teaching in a smaller school which had experienced many staff changes and a number of temporary appointments. The larger school provided guidelines for the beginning teacher induction programme and had a practice of strongly supporting professional learning and socialisation. The induction programme and the professional learning experiences at the smaller school were fragmented and fragile. The beginning teacher in the larger school grew in her knowledge and confidence through the guidance she received, while the beginning teacher in the smaller school struggled through the lack of advice and guidance. Lovett and Sinclair recommend that all schools have a written policy and guidelines for the mandatory advice and guidance programme for beginning teachers, and that tutor teachers attend professional development to enable them to provide the necessary support. Lovett and Sinclair go so far as to recommend that a registration system for tutor teachers be set up, to be based on an appraisal of the quality of support they provide for beginning teachers.

Learning to be a teacher in New Zealand

As reported in the international literature, the transition from preservice education to teaching independently is a stressful time for beginning teachers. In New Zealand, Grudnoff and Tuck (2002; 2003) conducted a longitudinal study of a cohort of 400 preservice teachers in their first two years of teaching. To gather the data, they surveyed the entire cohort. The survey was followed by interviews with twenty beginning teachers and their tutor teachers in the study's first year and 16 of these pairs in the following year. While all the participants interviewed went through a stressful

LITERATURE REVIEW

period in their initial year of teaching, they reported feeling reasonably confident as teachers towards the end of their second year. They had acquired a better understanding of the politics and ‘systems’ of the school. Grudnoff and Tuck (2002) found that tutor teachers and the professional culture of the school were critical to this development. However, they did not report on the varying types of professional cultures that existed in the participants’ schools. We are therefore not made aware how particular professional cultures may have supported or constrained the beginning teachers in their professional learning.

In their feedback to the research team, the beginning teachers in Grudnoff and Tuck’s (2002) study wished they had learnt more ‘craft knowledge’ during their teacher preparation. Craft knowledge has been defined as the practical knowledge teachers use in the everyday experiences as a classroom teacher in meeting the students’ needs (Snook, 2000). Grudnoff and Tuck (2003) argue that while teacher educators must ensure that preservice students develop a knowledge of teachers’ work at the practical knowledge level, they must also ensure new teachers have the ability to reflect critically on educational issues from different points of view. Snook likewise argues that teachers need strategic knowledge about schooling from a historical, philosophical and political perspective to understand the complexity in teaching.

Beginning teachers’ feedback on the value of their preservice education can be distorted if they forget that preservice teacher education is but the first stage on a continuum of initial teacher education (Lang, 2001). They may not fully realise that the purpose of the advice and guidance programme with the support of a tutor teacher is a continuation of their initial teacher education, the end point of which leads to full registration. Lang stresses that preservice teacher educators should nevertheless consider the merit of issues identified by beginning teachers so as to inform their understanding of how best to meet preservice teachers’ actual needs.

LITERATURE REVIEW

Surprisingly, none of the New Zealand studies discussed in this section mentions ICT. There could be several reasons for this. Firstly, ICT is not a curriculum area in itself but is seen as an integrating resource: “All learners will use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community” (Ministry of Education, 2002, p. 6). Secondly, ICT is also the name given to one of the areas for learning in the technology curriculum (Ministry of Education, 1995). Thirdly, ICT use is only mentioned as a suggestion in the “Satisfactory Teacher Dimension,” the set of criteria that lead to full teacher registration. For example, ‘professional knowledge’ requires that a teacher “demonstrates knowledge of appropriate technology and resources,” which could include “planning to use information technology in programmes” (New Zealand Teachers Council, 2002, pp. 19-20). The vagueness with which ICT use is being suggested clearly implies that ICT is not considered very important in its own right. For these reasons, it is perhaps not surprising that researchers have not investigated ICT in the context of beginning teaching.

To conclude this section on the New Zealand literature about the context for beginning teaching, I have provided an overview of the policy and practice involved in becoming a registered teacher. Induction was identified as particularly important. The extant body of literature deals with beginning teachers and stress, their induction experiences, and reflection on their preservice education. However, none discusses ICT. There is a clear gap in the literature. I therefore move to the New Zealand literature on ICT in preservice teacher education to understand what preservice teachers learn about technology as a preparation for their use of ICT as teachers.

New Zealand Research on ICT in Preservice Teacher Education

A growing interest in preservice teacher education has resulted in a number of small-scale New Zealand studies that focus on ICT in preservice education. Most are based on surveys and questionnaires and reflect individual teacher educators' interest in knowing about their preservice teachers' skills and knowledge in ICT, preservice teachers' perceptions about technology, and the impact of those ICT courses they teach. The majority of these studies have appeared in the New Zealand journal *Computers in New Zealand Schools* or have been presented at conferences. In this section I will review and discuss this literature under three headings: the practicum, ICT in preservice programmes and standards in ICT.

The practicum

The practicum is a key theme in this body of literature. Not surprisingly, the most common issue that stands out is whether the preservice teacher's associate teacher uses ICT or not. Hunt (2000) explored this question in a survey of primary and early childhood preservice teachers in their first and third year, and secondary preservice teachers at the point of graduation at a large college of education. The results showed that many preservice teachers had not observed an experienced teacher use technology as part of the classroom programme. Many of the respondents also reported that they had not used ICT in their own teaching practice while on practicum. This is supported by my own qualitative study of four primary preservice teachers who were close to graduation. This study examined their sense of preparedness to use ICT (Elliot, 2004). My findings showed that the participants had not seen their associate teacher use technology meaningfully in the teaching and learning programme. They had made no planned use of technology themselves, nor had it been suggested that they include ICT in their planning. Tellingly, one participant commented that while most classrooms had

computers, he had never seen a teacher use them, while another reported that the computers were not turned on at all in a number of classrooms.

The disposition towards technology is one of the factors that affect teachers' use of ICT in classrooms (Milbrath & Kinzie, 2000; Zhao et al., 2001). Shaw (2004) compared preservice teachers' attitude towards and confidence to use ICT in a one-year graduate programme. One group in the study consisted of preservice teachers who were two-thirds of the way through their programme. Data were gathered through two questionnaires, with one distributed before the practicum and the other after. Questions asked included whether the preservice teachers knew what technology integration looked like. Before the practicum 72% of the group were reasonably confident they knew what integration of ICT looked like. After the practicum this self-confidence had dropped to 44%. The participants cited that reasons for this change were their associate teacher's lack of ICT use and that students mainly used the computers to play games on a wet day. Shaw found that although the practicum confused the preservice teachers, their general attitude towards technology remained positive. Shaw (2004), Elliot (2004) and Hunt (2000) agree on the view that positive practicum experiences with ICT appear to be vital in preparing beginning teachers to use technology meaningfully. They recommend that practicum placements be carefully selected to give preservice teachers exposure to good models for ICT use and that they be encouraged to experiment with technology supported by an experienced teacher. In this, they are in agreement with the international literature.

ICT in preservice programmes

Studies of ICT in preservice programmes were similarly small scale and assessed the outcome of individual courses. Several set out to challenge preservice teachers' transmissive and teacher-centred conception of classroom learning. One such study was conducted by Forbes and Ipsen (2004), who were employed respectively in teacher

LITERATURE REVIEW

education and in a middle school. The participants consisted of five groups of first-year preservice teachers taking an ICT course, and five groups of technology-using middle school students attending an accelerated class. Prensky's (2001) notion of 'digital natives' and 'digital immigrants' underpinned the research project. The middle school students were regarded as digital natives who had grown up with ICT, and the preservice teachers as digital immigrants, who had not. A second underpinning theme was the idea that students' views are valuable but often ignored. The ICT preservice lecturer's intention was to disrupt first-year preservice teachers' tendency to view the role of the teacher as one of transmitting information and controlling the class. They contended that listening to students' voices might challenge this view. Face-to-face meetings between the preservice teachers and the middle school students were held before an asynchronous online discussion was set up. Through interaction with the students in the online discussions the preservice teachers were challenged by the middle school students and forced to reconsider the role of the teacher and of ICT in teaching and learning. The discussion also highlighted their shallow conception of technology use in teaching and learning.

The claim by Forbes and Ipsen (2004) that the middle school students were able to challenge and stimulate the preservice teachers' thinking has some merit. However, the students' phrase, "We don't learn about ICT, we learn through ICT" (Forbes & Ipsen, 2004, p. 52), appears to be scripted from the current ICT rhetoric, exemplified by the Ministry of Education's ICT policy: *Digital Horizons: Learning through ICT* (2003). It is also debatable whether the students' dialogue bore out the authors' assertions. Furthermore, a level of technocentrism was evident in the students' dialogue, demonstrated by a discussion of the relative merit of digital classrooms.

Another study that used technology to challenge preservice teachers' preconception of teaching and learning focussed on illustrating the meaningful use of

LITERATURE REVIEW

ICT in the technology curriculum (Falloon, 2001). Third-year preservice teachers who took an optional ICT module, participated in an individual multimedia project. The preservice lecturer's aim was to model a problem-solving approach to classroom use of ICT, which had the potential to illustrate the value of a student-centred pedagogical approach. In the process of completing the project, the preservice teachers were expected to develop ICT skills in a peer-supported environment scaffolded by the lecturer.

The project ran for 14 weeks with three hours per week class time and an expected 50 hours of additional time for personal study. The specific brief was to develop a solution to an identified information need or problem, using the technology curriculum's technological practice approach (Ministry of Education, 1995). The result was to be presented on a CD or website. The preservice teachers had to carry out the necessary research including concepts in learning and cognitive theories, gather and analyse the data, conduct interviews and take video and still photographs. Throughout, they had to keep a reflective journal about the processes, knowledge and skills developed and strategies used.

The reflective journals as well as informal observations and interviews formed the data for Falloon's (2001) research. Findings were that this particular approach was highly motivating for the preservice teachers and resulted in a shift towards a cooperative environment with widespread peer tutoring and cooperative problem solving. The preservice teachers found the technical skill development of particular value. They reported that the extent and depth of the project gave them skills and strategies that were transferable, thus increasing their self-efficacy beliefs. Issues noted included having access to ICT equipment suitable for the tasks, and difficulties reflecting on managing access to ICT in a classroom with only a few computers.

LITERATURE REVIEW

To plan for preservice teachers' needs in ICT it is necessary to establish their prior knowledge. Hunt (2000), as reported earlier, surveyed the 1999 cohorts of primary and early childhood preservice teachers in their first and third year and graduate secondary preservice teachers in a large college of education. The survey sought to establish the preservice teachers' ICT and pedagogical skills in relation to technology use. The findings led Hunt to make some pertinent observations. While he rejects standards as a means of determining what preservice teachers should know, he calls for research to establish what can realistically be learnt in a preservice programme. He advocates that new graduates should know not only how to use technology, but also have a clear understanding of the role of ICT in schools. In addition, they must have a well-grounded philosophy of teaching. Hunt is not convinced that more technology in itself will lead to greater ICT capability in beginning teachers. He argues that little government investment has gone into ICT development for colleges of education. He nevertheless recommends that teacher educators examine their own teaching practice with technology and undertake research to inform this practice, preferably with the material support of the Ministry of Education.

Hope (2004) carried out a similar questionnaire-based study on preservice teachers' prior knowledge about ICT. The participants were preservice teachers in either their second or final year, or in a one-year graduate programme. The questionnaire was distributed at the beginning of their ICT-orientated coursework. One hundred and thirty females (79.3%) and 34 males (20.7%) returned the questionnaire. One section of the questionnaire contained 27 items about prior technical knowledge and competence. A main finding was that the mean self-rating did not reach a 'confident user' level on any of the types of prior knowledge, for example email and operating systems. Hope argued that with the paucity of New Zealand research on ICT in preservice teacher education and beginning teaching, it is not possible to conclude whether overseas experiences

apply to the New Zealand context. However, at the conclusion of the study he conceded that unless preservice programmes develop ways to increase preservice teachers' level of technology skills, New Zealand beginning teachers risk remaining as poorly prepared to use ICT as they are reported to be in overseas studies.

Standards in ICT

As discussed in the section on the international literature, graduating standards in ICT for preservice teachers have been introduced in some countries, notably in the United States and in the United Kingdom. Issues implicit in the possibility of graduating ICT standards being introduced in New Zealand are discussed by Hope (2001). He expresses concern at the lack of prescribed ICT knowledge currently underpinning education, given the ubiquitous nature of technology in the world. One problem he identifies is that ICT is but one of the technology curriculum's seven areas for study; and even here, there is no indication of the specific ICT knowledge and skills to be learnt. From Hope's perspective, it is therefore entirely serendipitous what beginning teachers will know about and be able to do with ICT. Their capability will depend on innovations in preservice programmes and the preservice teachers' prior skills and knowledge. In discussing what possible graduating standards in ICT might look like, Hope dismisses the notion of mechanistic standards. He argues that learning theory relevant to technology use must also be a component. Above all, input from the teacher education sector would be critical.

Meanwhile, Brown and Vossler (2000) go further by arguing that standards in ICT are inconsistent with the meaningful use of technology in teaching and learning. They contrast a mechanistic view of teaching with that of teaching as a cognitive process underpinned by a broad understanding of educational theory and the context of education. While they acknowledge that ICT standards may increase the status of teaching and perception of teacher professionalism, they claim that standards in ICT

LITERATURE REVIEW

will not change preservice teachers' beliefs about teaching. They concur with the international literature that standards in ICT are likely to limit preservice teachers' preparation to that which the standards require. Standards should address the issue of preparing teachers from a critical perspective rather than focussing on technology per se.

To summarise, New Zealand research on ICT in preservice teacher education is very limited. Most of the extant studies are small-scale and survey-based. A number investigated the effect of the practicum on preservice teachers' knowledge and skills in using technology meaningfully in the classroom. Two issues about the practicum stood out: the need for preservice teachers to see experienced teachers model ICT use, and the opportunity to use technology themselves in a classroom. However, few preservice teachers in these studies did so. The likely effect of the introduction of standards in ICT was also discussed.

Chapter Summary

In this chapter, I reviewed the international and New Zealand literature. The purpose was to establish what is known about beginning teachers and their use of ICT for teaching and learning. The literature searches revealed that over a number of decades beginning teaching has been of particular interest to researchers in the international arena; yet relatively few scholars have examined the challenges beginning teachers face in their journey towards becoming technology-using teachers. In contrast to the limited studies about beginning teachers and technology, the literature on preservice preparation in ICT is prolific.

In reviewing the literature, I first examined the international studies and discussed them in the following groupings: learning to be a teacher, learning to be an ICT-using teacher, conceptions and beliefs about ICT, and preservice preparation and

LITERATURE REVIEW

ICT. The literature confirmed that teaching is contextual and an intellectual endeavour as well as a practical craft with no recipe for effective practice.

Two major influences on beginning teachers' development stood out: induction and school culture. Schools with a strong focus on beginning teacher development were likely to have an induction policy. Collaborative and integrated professional cultures, characterised by inclusiveness and support, were identified as critical to beginning teacher development. In contrast, veteran-oriented, individualistic and balkanised cultures made support for beginning teachers more difficult. Another point raised was the need for beginning teachers to develop micropolitical literacy in order to achieve their professional goals.

Emergent themes identified in the international literature on learning to be ICT-using teachers were: beginning teachers work in highly complex settings; their access to ICT resources and technical support is inadequate; observing experienced colleagues and enacting new insights with support is pivotal; and having mentors who are aware of the conceptual differences in the actions and thinking of beginning and experienced teachers is critical. The review indicated that beginning teachers' meaningful use of ICT is an issue of ongoing debate and concern.

Next, the chapter considered the influence of teachers' conceptions and beliefs about ICT. A number of rationales were examined. The literature showed that teachers could hold multiple competing and co-existing justifications for ICT use in schools. Teachers' conceptions and beliefs were shown to be the greatest predictor of how and to what ends they used ICT in their practice. Teachers therefore need strategic knowledge to enable them to analyse the assumptions that underpin their views.

The key challenges in preservice preparation in ICT were found to be the modelling and meaningful use of technology within preservice programmes, observing and using technology on the practicum, learning about pedagogical content knowledge

LITERATURE REVIEW

with (and without) ICT, and to teach and learn with standards. Except for a few notable exceptions, most studies evaluated single courses, were technocentric in their focus and small in scale. The need for preservice teachers to see experienced teachers model the meaningful use of ICT and to use technology themselves on practicum was an issue on which the literature was in agreement. Two scholars explored the concept of pedagogical content knowledge in teachers' technology use, pointing to a new level of understanding of teacher thinking. Lastly, standards as a means to improving beginning teachers' preparedness in ICT were discussed.

Next the chapter moved to review the New Zealand literature. The literature search had shown a dearth of literature on beginning teachers' use of ICT. To establish the context for beginning teachers' development in New Zealand, studies of policy and practice for teacher registration and induction were reviewed. It was found that many beginning teachers do not receive sufficient support during the initial year of teaching.

In the last section of the review the chapter discussed New Zealand research on ICT in preservice teacher education. As in the international literature, the practicum was considered important to preservice teachers' development of skills and understanding in using technology in teaching and learning. Another point made was the need for lecturers to model technology use in preservice teacher education programmes. Finally, the implications of standards in ICT in New Zealand were discussed.

The Focus of the Research

The literature reviewed in this chapter indicated that beginning teachers' use of ICT in their first year of teaching is a substantial challenge for many new teachers. The factors identified that influenced learning to be a teacher were induction, school culture, leadership, micropolitical literacy, conceptions and beliefs about technology, and preservice teacher preparation in ICT. Key themes in the international literature

LITERATURE REVIEW

specifically concerned with learning to be an ICT-using teacher were the complex settings of teachers' work, access to technology resources, opportunities to observe experienced technology-using colleagues and having access to appropriate mentoring.

Meanwhile, factors identified in the prolific international literature on preservice teacher education in ICT were the lack of modelling of technology use by lecturers, difficulties in placing preservice teachers with experienced technology-using associate teachers, relationship between pedagogical content knowledge and technology, and the impact of standards in ICT on preservice teachers' preparedness in technology. A small body of New Zealand literature on preservice teacher education in ICT exists; however it is fragmented. Most of the studies are small in scale, are based on surveys and questionnaires, investigate single cases and in several cases consist mainly of lecturers' evaluation of individual courses. The factors identified mirror those in the international literature and stress the importance of the practicum as a setting to learn about and practice teaching with technology, preservice teachers' technology knowledge, and lecturers' modelling of technology practice.

The search for New Zealand literature on the challenges beginning teachers may experience when using technology in their classrooms revealed a dearth of studies. This gap in our knowledge is a concern given the growing importance of technology in society—including schools—and the expectations that new teachers graduate as capable technology users. To best support beginning teachers in their development it is critical that we understand what experiences they have when they use technology in their classroom programmes. Specifically, we need to know the factors that influence their development as capable ICT-using teachers. Previous research has investigated the views of school principals and mentor teachers and other education professionals. This thesis seeks the view of the beginning teachers themselves. The overarching question this thesis seeks to investigate is therefore, "What are beginning teachers' experiences

LITERATURE REVIEW

when they incorporate ICT in the teaching and learning process in the classroom?” In the next chapter—The Research Process—I will discuss how this question was investigated.

CHAPTER THREE

THE RESEARCH PROCESS

This chapter describes the theoretical and epistemological underpinnings of the research for this thesis and the consequent decisions taken about its design and implementation. It then discusses and justifies the theoretical framework of the research: its underpinning epistemology and ontology, its theoretical perspective, and the methodological approach. Ethical considerations are explained and the validity of the findings justified. Next, the chapter outlines the data gathering methods: a questionnaire, a semi-structured interview and a photo-interview. The chapter then explains the research method, describing the procedure of developing the sample and collecting the data. Next, the procedures used to code and analyse the data are explained. The chapter ends with a description of the way the findings are presented over two chapters.

Introduction

As outlined in Chapter Two, the literature review identified a dearth of New Zealand research about beginning teachers' experiences with ICT in their first year of teaching. This thesis sought to address this gap in our knowledge. Informed by the review of the literature review, the research set out to investigate the factors that contribute to and limit beginning teachers in learning to become competent technology-using teachers.

This chapter describes and justifies the research process. First it sets out the specific questions framed by what we know and do not know about beginning teachers' experiences with ICT. It then discusses and justifies the theoretical framework of the research: its underpinning epistemology and ontology, its theoretical perspective, the methodology and, finally, the methods. Ethical considerations are explained and the validity of the findings justified. The chapter then describes the research methods

employed to gather the data. Next, it explains the procedures used to code and analyse the data. Lastly, the chapter outlines the procedure of arriving at the sample is explained and the data analysis.

Framing the Research Questions

The overarching question this thesis sought to investigate was: “What are beginning teachers’ experiences when they incorporate ICT in the teaching and learning process in the classroom?” The review of literature identified a number of factors that influence beginning teacher development. They were: induction, school culture, leadership, micropolitical literacy, conceptions and beliefs about technology, and preservice teacher preparation in ICT. Themes in the international literature were concerned with the complexity in learning to be an ICT-using teacher, access to technology resources, opportunities to observe experienced technology-using colleagues and having access to appropriate mentoring.

Detailed questions that would enable the overarching question to be answered were developed, framed by what we know and do not know about beginning teachers’ experiences with ICT, my research orientation and the scope of this thesis. The specific questions to which the research sought answers were:

- What personal and contextual factors do beginning teachers perceive as contributing to or limiting their successful use of ICT?
- What specific strategies do beginning teachers report using to resolve technology-related issues within the learning process?
- What formal and informal support is available to beginning teachers?
- What are beginning teachers’ experiences in putting educational theory into practice when using ICT?

THE RESEARCH PROCESS

- What aspects of their preparation do beginning teachers believe promote or limit their effective use of technology?

These questions could have been investigated in a number of ways. For example, observations in the classroom over time provide direct access to the natural setting of beginning teachers' classroom practice with ICT. However, the scope of this thesis was limited to data gathering options that required less time in the field, while still obtaining useful data. The design and methods had to capture beginning teachers' experiences and change over the first year of teaching. A background questionnaire and semi-structured interviews on two occasions enabled me to obtain comparative data about beginning teachers' changing perspectives as a result of their experiences. In summary, in seeking answers to these questions, my interest was in hearing about the lived reality of a group of beginning teachers over the course of their first year of teaching. Their stories would help reveal how beginning teachers come to terms with understanding how learning happens in the classroom with the affordances of ICT.

Theoretical Framework

Describing a theoretical framework for a research project entails a journey of decision-making. These decisions have to be made to fit the purpose and aim of the investigation. Crotty (1998) describes a hierarchy of four premises that can be applied to a research activity (pp. 2-6). He characterises this as a process of choices beginning with a justification of the epistemological stance from which a researcher intends to approach the research problem. The next step in the process is choosing a theoretical perspective that best enables the research problem to be investigated. This in turn informs the methodology and, lastly, the methods chosen.

THE RESEARCH PROCESS

Table 3.1

The research process

Objective of research	To investigate beginning teachers' experiences with ICT
Epistemology	Constructionism
Theoretical perspective	Interpretivism
Methodology	Phenomenology
Methods	Questionnaire, semi-structured interview, photo-interview
Participants	Eight beginning primary teachers
Setting	The schools at which the participants were employed
Length of study	Interviews on two occasions 10 to 14 weeks apart during the participants' first year of teaching

Table 3.1 outlines the research process: the objective of the research, the theoretical framework and decisions about ‘who’, ‘where’ and ‘for how long.’ The next subsection of the theoretical framework is structured according to Crotty’s (1998) hierarchy of premises that underpin the research.

Epistemological and ontological underpinnings of the research

An initial consideration in the research process involves the researcher’s beliefs about knowledge and how it is generated—epistemology—and about how people view and experience the world. The two are inextricably linked and difficult to separate conceptually (Crotty, 1998). This subsection articulates the philosophical assumptions I as a researcher bring to the research.

THE RESEARCH PROCESS

Two of the main opposing philosophical stances in the research literature are objectivism and constructionism. An objectivist ontology can be characterised as the belief that reality exists independently of the observer, outside of human consciousness. Meaning and truth reside in things themselves. Epistemologically, it follows that when we recognise an object we are discovering the intrinsic meaning that already existed in the object. Objectivism characterises this meaning as objective truth.

In contrast, a constructionist epistemology holds that meaning is constructed as we engage with the world. Meaning is not inherent in objects and therefore cannot be 'discovered.' Yet, this does not entail that an external reality does not exist. Ontologically, the world is always 'already there' (Crotty, 1998, p. 44), but only becomes a world of meaning when we interpret our experiences.

Cohen, Manion and Morrison (2007) describe this ontological perspective as "the alternative view of social reality which stresses the importance of the subjective experience of individuals in the creation of the social world" (p. 8). This view of social reality was particularly relevant to the present study of a small sample of beginning teachers and their engagement with ICT in each of their classrooms. As Cohen, Manion and Morrison note, "the principal concern is with an understanding of the way in which the individual creates, modifies and interprets the world in which she finds himself or herself" (Cohen et al., 2007, p. 8).

Interpretation is influenced by culture and our embeddedness in it, and is "the source of the interpretative strategies we use to construct knowledge" (Crotty, 1998, p. 53). We are attuned by our culture to see things a certain way. At the same time our culture obscures alternative perspectives. The researcher, therefore, needs to be mindful that research carried out from a social constructionist perspective is not restricted by the orthodox meanings we have been taught to associate with social phenomena.

THE RESEARCH PROCESS

Researchers who take a critical approach to social constructionism interrogate taken-for-granted assumptions that result from our cultural background. For example, Crotty (1998) points to issues of reification and sedimentation. Reification may occur when we uncritically accept things as we perceive them from our intuitive, everyday meaning-making. We may believe this view as being ‘the truth.’ Such meanings can have deep roots. However, epistemologically and ontologically no interpretation can be objectively true or valid. Meanwhile, sedimentation refers to the layers of meaning that can become more and more distorted when based on taken-for-granted assumptions. Crotty suggests that the researcher views constructionism as a form of curiosity and adopt “a radical spirit of openness to the potential . . . [for] new and richer meaning” (Crotty, 1998, p. 51). At the same time he warns of concluding that meaning can simply be imposed on reality. In this regard he refers to the notion of intentionality, which can be characterised as the interaction between us and the object we are experiencing.

Returning to the research questions and how best to investigate them, the objective of the thesis was to gain insight into and understanding of the factors that impact on beginning teachers’ classroom use of computers. Put another way the research sought to understand the phenomenon from the perspective of the participant by hearing what they had to say about their experiences. It should be noted that an examination of the personal experiences of a small number of beginning teachers affords potentially useful insights on the participants’ individual experiences, but clearly the results cannot be generalised to all first year primary school teachers. The emphasis on gathering insights from an inside perspective suggested that a theoretical framework underpinned by critical social constructionist epistemology (Crotty, 1998) was suitable for this investigation. This suggested that a theoretical framework underpinned by a critical social constructionist epistemology was suitable for this

investigation. Next the theoretical perspective best suited to the process of answering the research questions is considered.

Theoretical perspective of the research

Crotty's (1998) approach to selecting a research path to guide a research process differs from that of some previous scholars. Instead of the traditional 'contest' between a quantitative and qualitative approach, he asks whether researchers intend to present their findings as objective truth or as interpretations. He asserts that the contest is between positivism and non-positivism.

Positivism has been called absolutist because of its strong desire for certainty. Historically, it derives its name from the distinction between 'natural' knowledge, arrived at by speculation, and 'positive knowledge,' that is knowledge which is posited—a 'given' and indisputable fact (1998). Positivism holds that facts about the world can be discovered by the use of scientific research methods, which ensures that data obtained are not 'contaminated,' for example by subjective bias. By maintaining a detached posture, researchers can 'find' objective truth that is accurate and certain. A positivist perspective was clearly not compatible with the research aims of this study, which were to gain insight into and understanding of the biographical and contextual factors that impact on beginning teachers' decisions about how and when to use ICT in their classroom practice, and when not to.

A theoretical perspective suited to the research objectives of this study is interpretivism. This holds that the nature of reality is socially constructed (Willis, 2007). It allows the researcher to examine the ways individuals make sense of the social world. Willis emphasises that context is critical to an understanding of the data. Criticisms of interpretivism include the claim that "interpretivism is overwhelmingly oriented towards an uncritical exploration of cultural meaning" (Crotty, 1998, p. 60). The path interpretivist researchers treads is therefore a narrow one, while

THE RESEARCH PROCESS

simultaneously acknowledging that we cannot always mitigate the inevitable drawbacks of methodological dilemma. We can, however, pay attention to our own assumptions and maintain an awareness of the complexities in the data.

Methodological underpinnings of the research

The focus of the research was on understanding experiences from the perspective of the participants. One of several overlapping research methodologies that enable the researcher to examine the lived experiences of people is phenomenology.

Phenomenology is concerned with the structure of how people perceive the world and focuses on the ‘things themselves’—phenomena as they present themselves to our consciousness directly before they are filtered through what we are taught to associate with phenomena we perceive. If we can set aside the understandings we have acquired through enculturation new meanings may emerge. We may do this through setting aside—*bracketing*—our preconceptions and engage with “*what we directly experience*; that is, the objects of our experience before we start thinking about them, interpreting them or attributing any meaning to them. These are the *things themselves*” [emphasis in the original] (Crotty, 1998, p. 79). Through bracketing the understandings we may be able to let the experience of phenomena speak for themselves.

From a phenomenological perspective all human actions are intentional in the sense that “consciousness is always consciousness *of* something. An object is always an object *for* someone. The object, in other words, cannot be described apart from the subject, nor can the subject be adequately described apart from the object [italics in the original]” (1998, p. 79). However, intentionality—a central concept in phenomenology—is only retrospectively available to our consciousness (van Manen, 1990). The world as we perceive it already exists, is already there.

Phenomenology “treats culture with a good measure of caution and suspicion” (Crotty, 1998, p. 71) and “calls into question what is taken for granted. It is a critique

and grounds a critical methodology” (Crotty, 1998, p. 82). In this sense, the stance taken in this research was therefore a critical one. As a methodological approach phenomenology was appropriate to this investigation as it is deeply rooted in seeking meaning while attempting to cast aside the constraints of enculturation. It acknowledges the difficulties in doing so. Phenomenology is thus a critical methodology in keeping with the objectives of this study.

This subsection explains what is meant by phenomenology and its suitability as an underpinning approach for the selection of methods to help investigate the overarching question of this thesis: “What are beginning teachers’ experiences when they incorporate ICT in the teaching and learning process in the classroom?” In the next subsection the methods of data collection are discussed.

Methods of data collection

Several data gathering methods were chosen:

(a) A *questionnaire* which sought demographic information, participants’ characteristics and their prior knowledge and experience with ICT. Biographical data and background information contextualised participants’ experiences. As prior knowledge influences how phenomena are experienced, this kind of information could facilitate understanding and interpretation.

(b) A *semi-structured interview* to hear through the participants’ own voices about their experiences with ICT as first year teachers. It was anticipated the interview would afford an understanding of the participants’ conceptions about and experiences with ICT in the classroom; that they would relate the kinds of support they received from mentors and other colleagues; and that they would talk about ways they resolved ICT-related problems within the learning process.

(c) A *photo-interview* based on classroom photographs taken by the participants. Direct observation was not feasible because of the limited scope of the study. For that

THE RESEARCH PROCESS

reason, a photo-interview component was incorporated into the second interview. This strategy involved the participants taking photos of classroom activities that included ICT, capturing visual data about ICT use on which to base discussions during the interview. The photographs would also direct the beginning teachers' talk towards a commentary of their thinking and action within their practice with technology. It was envisaged the photo-interview would help answer questions about the participants' pedagogical reasoning when using ICT and at the same time illustrate their rationale for using ICT. This interview would also ask participants to reflect on their preservice teacher education and their sense of preparedness to use ICT as beginning teachers.

These methods were chosen as most appropriate for yielding answers to the research questions. Multiple methods of data collection can strengthen internal validity (Merriam, 1998) or trustworthiness. The three sources of data on beginning teacher knowledge and experience were also intended to provide a richer description of their classroom experiences. Following is a description of each method under the topics of understanding the participants' background and understanding their perspective.

Understanding the participants' background

It was anticipated that the questionnaire (Appendix D) would help contextualise the interview data, and facilitate an understanding of the complexity of the participants' biography, previous experiences with ICT and school context. Some questions were open-ended to encourage an unstructured, personal response (Tuckman, 1999). Categories of information included were: (a) participant information, (b) personal data, (c) educational background, (d) personal ICT background, (e) professional ICT background, and (f) ICT facilities available. These categories were arrived at from the research questions, and from relevant and tested questionnaires found in the literature. They were selected to help 'set the stage' and to underpin my own understanding of the personal nature of the participants' experiences during the interviews and the analysis

THE RESEARCH PROCESS

process. A full pilot study was not conducted as the information asked for consisted of unambiguous demographic and personal information. Moreover, a pilot study would have been problematic because of the purposive nature of the sample using a maximum variation sampling strategy. In addition, the open-ended questions were few in number and neither sought information about sensitive areas, nor, for example, sought to precisely measure attitude or disposition.

Understanding the participants' perspective

A semi-structured interview protocol was chosen for the first interview, as I wanted to understand the perspective of the participants unconstrained by my own preconceptions. In this type of interview the researcher acts as an 'instrument' with the ability to capture the complexity, nuances and unevenness in human experiences (Maykut & Morehouse, 1994). The researcher therefore expects the unexpected and adapts the interview questions to probe new aspects of the phenomenon being investigated as revealed by the participant. Maykut and Morehouse refer to 'the qualitative posture' that allows for the unanticipated 'twist and turns' in the interview.

Interviewing is not an unproblematic process with context irrelevant and the researcher in control. Because 'facts' in this kind of research are socially constructed, they are influenced by the way they are 'held' (Tripp, 1983). Maykut and Morehouse (1994) describe the notion of 'indwelling' as a means to understand the other person's perspective. This involves immersing oneself in the situation and attending to the meaning articulated. Tacit knowledge also influences the nature of interview responses, and participants do not necessarily have well-formulated views on all aspects of the research topic. Some responses may be 'off-the-cuff' comments while others may result from long-held views. Responses should therefore not be treated as if all are of equal importance (Tripp, 1983). Maykut and Morehouse argue that the paradox for the researcher is to be "acutely tuned-in to the experiences and meaning systems of others"

THE RESEARCH PROCESS

and at the same time “be aware of how one’s own biases and preconceptions may be influencing what one is trying to understand” (Maykut & Morehouse, 1994, p. 123).

Researchers often ignore ambiguities in interviewing and issues of language and meaning (Scheurich, 1995). Scheurich emphasises that “the language out of which the questions are constructed is not bounded or stable; it is persistently slippery, unstable, and ambiguous from person to person, from situation to situation, from time to time” (Scheurich, 1995, p. 240). Interviews are socially interactive and participants often moderate their responses according to their perception of what the researcher expects. Furthermore, the participants might reveal more than they intended (Limerick, Burgess-Limerick, & Grace, 1996).

The semi-structured nature of the interview schedule chosen for this study enables the researcher to follow “the contours of the investigation as they emerge” (Maykut & Morehouse, 1994, p. 34). However, Scheurich asserts that both researcher and participant have conscious and unconscious intentions and desires. He suggests that, at a minimum, the researcher must declare the ‘baggage’ brought to the research project in the ensuing report, and also foreground the uncertainties experienced.

Another pertinent issue in this study was the politics of interviewing. This is particularly significant where a power differential exists, for example in interviews between students and teachers. However, contrary to previous observers’ assertions that the power in the interview process invariably lies with the interviewer (Mishler, 1986), the power dynamics in research relationships is simultaneously symmetrical and asymmetrical (Limerick et al., 1996). This balance of power alternates during the interview phases. The participant initially holds the greater power due to the researcher’s dependence on the participant as the source of data. The choice of venue and the nature of interactions during the interview also influence the power relationship. An interview in a participant’s school environment, for example, puts the researcher in

THE RESEARCH PROCESS

an outsider position—a guest in someone else’s territory. In contrast, the researcher controls the interview to the degree of having set the agenda.

Photo-interview

Photo-interviewing is a data gathering method where photographs are used to evoke comments and discussion in the course of an interview. Photo-interviewing is well-documented in social science research, for example in the area of health (Radley & Taylor, 2003; Wang, Burris, & Xiang, 1996) and consumer science (Heisley, McGrath, & Sherry, 1990; Holbrook & Kuwahara, 1998). However, few examples of its application in educational research exist (Carlsson, 2001; Tucker & Dempsey, 1994).

Through their pioneering work with photography used in anthropological research, Collier and Collier (1986) realised that photographs could be used to obtain information beyond that portrayed in the images themselves by simply asking people to talk about them. Photographs can act as a conduit for communication between people who do not know each other, as a starting point and as reference point. Collier and Collier argue that photographs can be useful because they allow participants to take the lead. When probing for specific information, photographs represent a tangible reference point that invites open discussion. Photographs can also act as a third party, allowing researcher and participant to explore the photographs together and relieving the participant of the stress of being the object. Instead the participant becomes the expert who takes the researcher into the content of the picture, thus transcending the researcher/participant dichotomy.

In most cases where photographs have been used in data gathering in previous research, the researcher or a member of the research team controlled the camera and took the photos. Therefore, decisions about what counted as data rested with the researcher. Photo-interviewing, or photo-elicitation, has evolved more recently as a technique for exploring people’s lives. Here the participants take the photos themselves

THE RESEARCH PROCESS

and this was the method used in the present study. This type of process has been labelled ‘reflexive photography,’ where the participant “shares in the definition of meaning; thus, the definitions are said to ‘reflect back’” (Harper, 1988, pp. 64-65). It has been argued that photo-elicitation can “be regarded as a postmodern dialogue based on the authority of the subject rather than the researcher” (Harper, 2002, p. 15).

Harper (1988) asserts that a photo-interview “produces information that is more deeply grounded in the phenomenology of the subject. A photograph, a literal rendering of an element of a subject’s world, calls forth associations, definitions, or ideas that would otherwise go unnoticed” (Harper, 1988, p. 65). In her discussion about using photographs as a tool to understand how people experience their world, Carlsson (2001) posits five arguments: (1) new methods enhance educational research; (2) photos can serve as a communication bridge; (3) photography makes it easier to present a situation; (4) a photo can express the photographer’s relation to the world; and (5) explanations of photos amplify expressions of feelings. Carlsson argues that her arguments are validated through the richness of the data resulting from using photographs as a basis for interviewing and to depict peoples’ experiences.

In this study, photographs used within the context of an interview presented an alternative opportunity to ‘see into the classroom.’ It was expected that this study would provide an opportunity to make observations about the usefulness of photo-interviewing as a research method in education and add to the small body of knowledge that currently exists.

Ethical Considerations

Ethical considerations were an integral part of developing and enacting the research process for this thesis. The underlying purpose for considering ethics in research is to balance the potential harms and benefits of a research activity. The

THE RESEARCH PROCESS

identification and mitigation of potential harms and dilemmas relating to the participants of this study were guided by Massey University's *Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants* (Massey University Human Ethics Committee, n.d.). The code outlines eight principles based on the notions of respect for persons, autonomy, privacy and justice. These formal requirements are consistent with established practice in educational research, for example the ethical guidelines published by the New Zealand Association for Research in Education (NZARE) (1998). The proposed research was approved by Massey University Campus Human Ethics Committee: Wellington (Appendix E).

Informed consent

I began the process of gaining informed consent to access the participants by contacting their principals by letter (Appendix F). I felt this was appropriate as I expected to interview the participants in the school and because the students in the participants' class were likely to appear in photographs the participants would take.

The participants were provided with an information sheet explaining the nature of the research project and what participation would involve (Appendix G). The researcher and supervisors' contact information were also provided. Written consent was obtained from each participant. The consent form explained that participation was voluntary, that the participant might decline or withdraw at any stage without penalty of any kind and could do so without having to provide reasons (Appendix H).

The research did not involve any contact with students. However, I deemed it appropriate to obtain consent from the students and their parents or caregivers to permit the participant teachers to take photographs of classroom activities that were likely to involve students. I judged this necessary as I would take the photographs away from the school. A current heightened awareness that students might be vulnerable if their images were posted online is noted in *Guidelines for the Online Publication of Student*

THE RESEARCH PROCESS

Images and Schoolwork (Ministry of Education, 2000). Photographs taken at a non-public venue—the school—without parents or caregivers’ consent could also have been perceived as breaching students’ right to privacy. An information sheet (Appendix I) and form consenting to be photographed (Appendix J) were therefore prepared for students and written at a level of language appropriate for their age. An information sheet (Appendix K) and consent form (Appendix L) were also provided for their parents or caregivers. The participants were asked to make sure students did not feature in the photographs where no consent was given.

Confidentiality, anonymity and privacy

The data were treated in a way that protected the confidentiality, anonymity and privacy of the beginning teachers, schools and children in the study. The names of participants and their schools were changed to protect their identity. The participants were asked to choose a pseudonym. The exact size of the schools was not disclosed but rounded so the school could not be identified from this information.

No information obtained during the study was discussed with people other than my supervisors. I transcribed the taped interview audio-recordings myself thereby ensuring that what the participants had told me remained confidential. The transcribed audiotapes were stored in a locked safe at my home. The consent forms and transcripts were stored separately in a locked filing cabinet. Data will be retained for at least five years after which it will be destroyed. The data stored on my personal computer can be accessed by a password known only to me.

Minimisation of risk for harm

To minimise the potential for harm, the participants were treated with respect and consideration throughout the research process. I was mindful of not causing stress and embarrassment. For example, when developing the questionnaire I ensured the

THE RESEARCH PROCESS

questions were phrased so that the participants could understand them and thus provide answer without disquiet (Neuman, 2000). When I needed to arrange an interview with the participants, text messages in the evening appeared to cause less stress than email. Another strategy I used to treat the participants with respect and minimise harm was to return the interview transcripts to them for checking and editing.

Ethical dilemmas

Ethical dilemmas are likely to arise during the research process, often unexpectedly. When they do, the researcher has to make judgements, sometimes in the moment, without great thought or preparation. A dilemma that arose during this research over a school with a policy of not letting parents and caregivers know which teacher was a beginning teacher. My prepared information sheets and consent forms could not be sent home with the students. I rewrote the information sheets and consent forms without acknowledging the status of the teachers, judging that the risk of harm through deception by omission was small. Another ethical dilemma occurred when a participant characterised another participant known to her in an unflattering light. My course of action was to be mindful that these comments should not frame or enter into the analysis and interpretation of interview data from the participant's colleague.

Issues of Validity

The relevance of validity to qualitative research is hotly contested. The concept has its roots in the discourse of reliability, validity and generalisability that underpins research in the positivist paradigm (Kvale, 1996). As a consequence of the historical dominance of that paradigm in social science research, qualitative researchers have felt it necessary to defend the validity of their research efforts. Some qualitative researchers have rejected the concept of validity on the grounds that it is incompatible with the subjectivity inherent in qualitative research (Wolcott, 1990). Some avoid using the term

THE RESEARCH PROCESS

altogether (Reason, 2006), while others again argue that ignoring it will not improve the acceptance of qualitative research (Lather, 1986).

Kvale proposes a reconceptualisation of the concepts of reliability, validity and generalisability into forms that are appropriate for qualitative research. He asserts that knowledge is socially constructed and that an “understanding of verification starts in the lived world and daily language where issues of reliable observations, of generalisations from one case to another, of valid arguments, are part of everyday social interaction” (Kvale, 1996, p. 231). Adopting Kvale’s reconceptualised approach, I integrated a number of steps into the research process. For example, I have articulated my bias as a researcher to the reader—past experiences and orientations that have influenced the approach and interpretation of the study. I have thus allowed the reader to make his or her own judgement about the validity of the findings.

Another potential concern is the reliability and validity of the interview transcripts. Misrepresentation may occur in the act of transcribing—or transforming—oral language into text, as judgements and decisions are made during this process. To address this issue I transcribed the interviews myself and did so as soon as practicable after the interview had taken place. The context was still fresh in my mind and the thoughts expressed still powerfully with me. I promptly returned the transcripts to the participants with a stamped, self-addressed envelope and invited them to change anything they felt did not accurately reflect what was said. Lastly, I have outlined in detail the steps taken in the research process. Through this rich description the reader is able to make judgements about the reliability of the research outcomes.

Research Methods

This section describes in detail the practical steps taken in carrying out the research. First the sample is described and then the procedure of data collection explained.

Sample

This subsection outlines the process of arriving at the final sample from a group of self-selected beginning primary teachers, graduates of a single New Zealand teacher education institution. The sampling strategy is described, the variables are listed and the rationale for their selection given. Next the process of accessing the participants and the developing the sample are described. Lastly, the initial composition of the sample and then the final sample are presented.

The nature of the sample

In selecting the sample, I had choices to make: Would my sample come from a single institution or all providers. The sample size which was feasible in this study would never be representative of the wider population of beginning teachers, so the choice I was faced with was whether to try to cover many institutions at a more surface level of analysis or focus on one institution, which allowed for a more in-depth analysis. In the end, I chose the latter. The study, thus, set out to examine the individual experiences of a limited number of teachers. In choosing depth rather than breadth of focus, this meant that the findings were not generalisable to the larger population of beginning teachers.

Having made this decision, I was faced with the challenge of how to recruit the sample from within the one institution. The dilemma was balancing the individual privacy issues for participants and the fact of having to negotiate with the teacher education institution. The sample therefore was a compromise between what was

THE RESEARCH PROCESS

possible and what would have been ideal. It has to be said that many of the constraints I faced in the sample selection were beyond my control.

The justification for selecting participants from one preservice teacher education institution was to overcome privacy concerns in negotiating access to other preservice teacher education institutions. This was consistent with the qualitative nature of the study, which was not conceptualised to generalise across the whole sample of New Zealand beginning teachers.

The advantages of having the participants from the same preservice programme are the possibility of having a variety of individual experience from a sample of participants who have the same institutional experience. At the same time both their individual characteristics and past experiences will vary as well as their institutional and school practicum experiences. The advantage is the ability to focus on the differences in individual traits and characteristics. Furthermore, this sample can provide feedback about the preservice teacher education programme in question, and investigate how these new teachers fare in disparate school environments based on their participation in programmes from the same preservice teacher education institution. The limitations of having the participants from the same preservice programme are that one cannot generalise from one preservice teacher education institution to another.

Sampling strategy

Based on the review of the literature and my personal and professional knowledge as a primary teacher and teacher educator, six criteria were selected as the basis for inclusion in the sample with the intention of generating maximum variation in the selection of participants and their school contexts. Consistent with the philosophical grounding of the methodology, the greatest variation possible between the cases was aimed for in anticipation that greater richness overall could be expected. This is consistent with the assertion by King, Keohane and Verba (1994) that “the more

THE RESEARCH PROCESS

evidence we can find in varied contexts, the more powerful our explanation becomes, and the more confidence we and others should have in our conclusions” (King et al., 1994, p. 30).

A maximum variation sampling strategy in qualitative studies contrasts with the concept of random selection typical of the quantitative paradigm. However, maximum variation sampling does not make any claims about generalisability (Maykut & Morehouse, 1994). It should be noted that the variables selected for this study are not randomly assigned but pre-existing characteristics among the participants (Wiersma, 2000). The decision to select a small purposive sample contrasts with other research on teachers and ICT, where larger samples have, arguably, yielded only thin understanding (Goodwin & Horowitz, 2002). It was also anticipated that these cases would demonstrate the complexity in these beginning teachers’ experiences in their individual school contexts and take into account their personal backgrounds.

The primary criterion for inclusion in the sample was that participants had a permanent teaching appointment at the Primary level for the school year following their graduation, that is the year in which the research was carried out. A permanent appointment gives beginning teachers access to resources such a laptop through the Laptops for Teachers Scheme or TELA², which seeks to develop teachers’ confidence and competence in the use of ICT. In contrast, Long Term Relievers (LTR) are not eligible for this particular opportunity. Furthermore, a school that employs a permanent beginning teacher is eligible for an additional 0.2 staffing entitlement for the first year. This entitlement is usually used to provide a beginning teacher with access to professional development, beginning teacher seminars and the opportunity to undertake

² From 2003, all permanent full-time and part-time teachers working at least 12.5 hours in Y7 and 8 classes in state and integrated schools became eligible to apply for a laptop under the TELA scheme, expanded to include Y4 to 6 teachers. Under the scheme teachers are reimbursed approximately two thirds of the costs of leasing a laptop. Long-term relievers, that is employed for greater than six consecutive weeks, are not eligible (<http://www.minedu.govt.nz/index.cfm?layout=document&documentid=8568&data=1>).

THE RESEARCH PROCESS

observations of teaching practice. A permanent beginning teacher is therefore more likely to have the support necessary for their professional development, including their progress as competent ICT using teachers.

The sample was intended to represent different regions of New Zealand and types of school. Based on similar studies (for example, Lind, 2004), it was judged that a sample size of between six and eight participants would generate sufficient geographical spread and school type. A geographical spread would avoid that the possibility of the data reflecting significant regional-specific approaches, for example the effect of a particular approach to ICT integration being advocated in one region's professional development opportunities. It was also necessary to be mindful of the scope of this study. Should more than the number sought meet the permanent appointment criterion, it was decided that a selection would be made on the basis of these five additional criteria: (a) gender, (b) geographical location, (c) whether urban or rural school, (d) decile rating of the school of employment and (e) whether participants had taken subject courses in ICT during their preservice education. In the event of too few participants being available, or a lack of variability in the sample, it was decided approaches to individual principals would be made.

It needs to be noted here that the sample selection by any other means would have been problematic because I was dependent on the institution to provide information about the cohort of students at their preservice stage. For reasons of privacy my options for accessing the students were also restricted.

Description of and rationale for each characteristic

Firstly, participants' gender was selected as a characteristic to be taken into consideration. The gender composition of teachers in primary schools at the time of the study was 81% female and 19% male teachers (Ministry of Education, 2005b), and

THE RESEARCH PROCESS

while it was not intended to have an exact proportionally representative sample, it should nevertheless reflect the current gender composition in schools.

Secondly, it was expected that selecting participants from schools located in a range of geographical locations would enhance the possibility of more diverse ICT school cultures being represented. Thirdly, the inclusion of participants from both urban and rural schools was considered desirable as approximately 30% of New Zealand primary schools are classified as rural (Education Review Office, 2001). Rural schools are small schools, 43% having a roll of fewer than 50 students and 92% fewer than 200 students. There are two types of rural schools: those located in an area with a population of fewer than 300 (83% of rural schools) and those in a settlement with a population of between 300 and 999 (17%) (Education Review Office, 2001). While only about 10% of all students attend a rural school, the context for teaching and learning in small and often isolated schools differs in significant ways from the context of their urban counterparts.

Fourthly, it was considered important to include schools with diverse decile ratings. Decile rating divides schools into 10 groupings where schools classified as decile 1 are in areas of greatest socio-economic disadvantage and decile 10 schools in areas of greatest socio-economic advantage. Derived from census information, five socio-economic indicators of households with children are used to calculate the decile of a school: household income, occupation, household crowding, educational qualifications and income support (Ministry of Education, 2005a). The decile of a school may influence access to ICT at home as well as at school. The difference in ICT access for students in high versus low socio-economic areas is usually referred to as the 'digital divide.'

Lastly, information was included about whether the beginning teachers had taken ICT as an elective course of study during their preservice education (Appendix M). The

THE RESEARCH PROCESS

intention was to assess the impact of the participants' perception of the value of such a course.

Accessing participants

I approached the cohort of primary graduates at the time of their graduation when they attended optional presentations about first year teaching. My access was through the Director of Primary Education of the teacher education institution. I explained the research project to the graduands and asked those potentially interested in participating to provide me their contact details. Unfortunately, for reasons beyond my control, fewer graduands than anticipated were present on this occasion and, as a consequence, fewer than expected expressed an interest in participating.

This process was chosen because it was judged it would provide the relatively small number of participants sought. Furthermore, a substantial delay would have occurred if I had waited and contacted the entire cohort of graduates the following year through their alumni association. The latter may also have posed some privacy issues. The method of access to the participants was also constrained by what the institution was willing to make available.

Process of developing the sample

At the beginning of the school year following graduation, I contacted by email those graduates who had expressed an interest in participating in the study and asked whether they had found a teaching position. Twelve beginning teachers confirmed that they had. Of these, one appointment was at the Early Childhood level and one in a relieving position for two terms. These were both excluded, as they did not meet the criteria set down for inclusion in the sample.

I next sent a letter to the principals of the schools where the remaining 10 beginning teachers were employed to obtain consent to access the potential participants

THE RESEARCH PROCESS

(Appendix F). The letter outlined the objectives of the research project and the process by which data would be gathered. I also included the participant information sheet to ensure the principal was fully informed about the research project (Appendix G).

Next I sent an invitation to those beginning teachers ($N = 8$) where I had obtained access, inviting them to participate in the research. Again, the participant information sheet that outlined the process and the time commitment was enclosed. At the same time I asked them to indicate if they had taken ICT as a subject study during their preservice education, which was one of the variables to be taken into account. In all, seven agreed to participate, while one declined due to her workload.

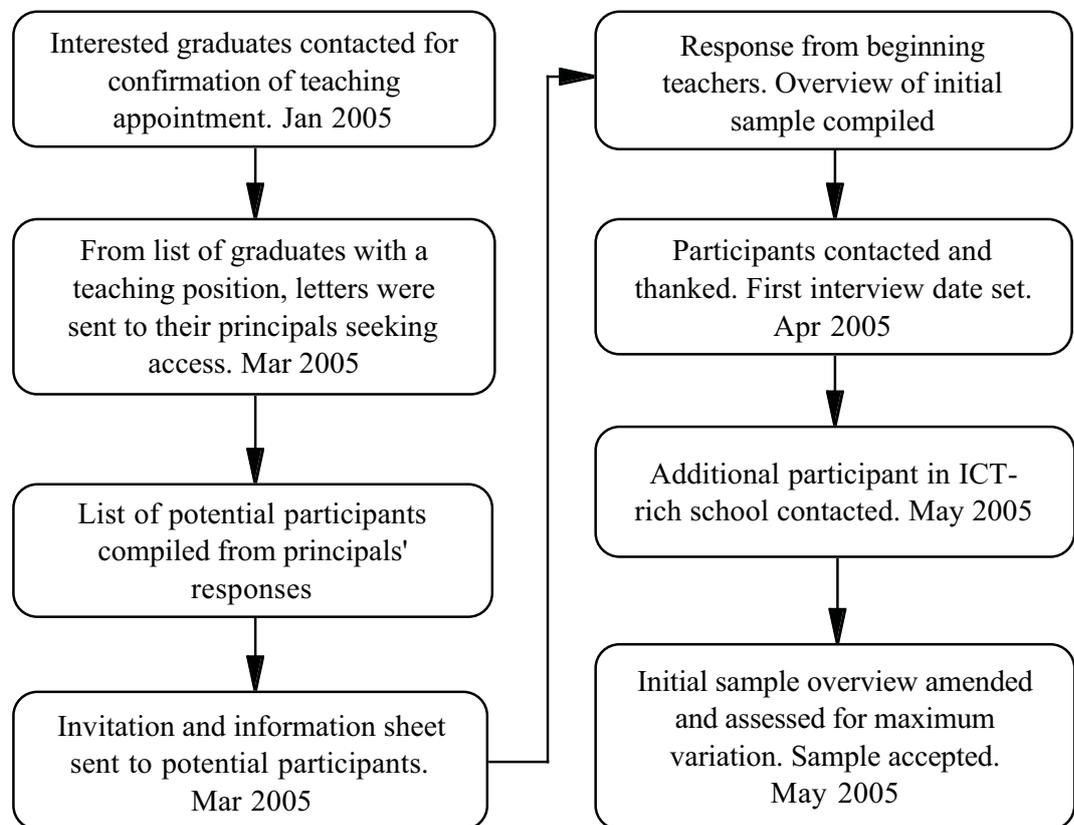


Figure 3.1. Process of developing the sample.

An overview of the process used to develop the sample is presented in Figure 3.1. The period extends over five months from first contact with the interested graduates to the completion of the final sample.

THE RESEARCH PROCESS

Initial composition of sample

At this point, I developed a profile of each school from information available on Te Kete Ipurangi (TKI), the Ministry of Education's information website. Using TKI's database of New Zealand schools I retrieved information for each school relating to the criteria for inclusion in the sample as well as school type and number of students.

Information was gained from the websites of six of the seven schools. From these I was able to gain an impression of the overall importance placed on ICT in these schools, for example from their curriculum delivery plans and pictorial documentation of student computer use. I also took note of the date each school's website was last updated as one potential indicator of that schools' ICT capability and culture. The information was then collated for analysis.

Tables 3.2, 3.3 and 3.4 set out the range of variability in the initial sample across the specified criteria and includes the website data. All schools were co-educational state schools and they were located in five regions from Northland to Southland. However, specific information about their geographical locations has not been included in the sample details to achieve the highest level of confidentiality for the schools concerned.

Table 3.2

Composition of the participants' contexts in initial sample

Participant ^a	Gender	ICT as subject study	Rural/Urban	Decile	Website	ICT mentioned	ICT Cluster participation ^b
John	Male	No	Rural	10	Y	Y	N
Lucy	Female	Yes	Rural	5	Y	N	N
Susan	Female	No	Rural	10	Y	Y	N
Kaye	Female	No	Urban	2	Y	Y	N
Arnold	Male	No	Urban	7	N	N/A	N
Annabel	Female	No	Urban	2	Y	Y	N
Mary	Female	Yes	Urban	6	Y	Y	N

^aPseudonyms have been used.

^b'ICT cluster' refers to Ministry of Education professional development programmes with ICT.

Participants were employed in three different types schools: four in Y0-6 contributing primary schools, three in Y0-8 full primary schools and one in a Y7-13 college (see Glossary of Terms for explanation of New Zealand school types).

Table 3.3

School type

Contributing primary	4
Full primary	3
Y7 - Y13 secondary school	1

The sample was spread more or less evenly across the most common school sizes, ranging from a small two-teacher rural school of fewer than 100 pupils to a large secondary school with nearly 900 students.

THE RESEARCH PROCESS

Table 3.4

Number of students in participants' schools

<100	<200	<300	<400	<500	<600	<700	<800	<900
1	1	1	2	1				1

^aNumbers have been rounded to protect schools from identification. *(based on 2004 roll)*^a

From the school profiles, I noted that although several schools mentioned having ICT facilities, none appeared to be 'ICT-rich' in terms of its use for teaching and learning as described, for example, by Leask and Younie (2001). They refer to such learning environments as innovative with new pedagogical practices emerging from the use of readily available ICT facilities. I therefore approached the principals of several schools well known within the education community for having an ICT-rich learning environment. The inclusion of such a school would enhance the variability of the sample. I asked these principals if they employed a beginning teacher from the same teacher education institution as the other participants. One principal indicated that the school did. I sent information about my research project to this principal to obtain access to the school. He replied positively and provided the beginning teacher's name and email address. On receipt of my invitation, as well as the information sheet outlining the research project, this teacher agreed to participate. This school had not participated in an ICT professional development cluster.

The final sample

Table 3.5 illustrates the final sample and its composition. The sampling method intended to ensure maximum variation within the sample in respect of gender, geographical location, whether urban or rural, decile rating and whether the beginning teachers had taken ICT as a subject study during their preservice education. However, the number of prospective participants did not reach a sufficient number to select for

THE RESEARCH PROCESS

maximum variation. In particular, just two participants stated that they had taken ICT as a subject study. In judging the composition of the available sample against the intended maximum variation, I was satisfied that the final sample constituted a fair representation of the proposed range.

Table 3.5

Final sample

Participant	Gender	Rural/Urban ^a	Decile	ICT as subject study
John	Male	Rural	10	No
Lucy	Female	Rural	5	Yes
Susan	Female	Rural	10	No
Kaye	Female	Urban	2	No
Arnold	Male	Urban	7	No
Annabel	Female	Urban	2	Yes
Mary	Female	Urban	6	No
Pam	Female	Urban	5	No

^aAs in the earlier initial overview, the specific geographical locations of the school have not been included to protect schools' anonymity. The schools have also been assigned a pseudonym

Data collection process

The process of collecting the data consisted of obtaining consent from the participants, asking them to fill in a baseline questionnaire, conducting the first interview and later the photo-interview.

At the time of thanking the participants for agreeing to participate in the study, I also set up a suitable interview date and time with them. This was not always straightforward as some participants were initially unable or unwilling to commit to a

THE RESEARCH PROCESS

specific date. I remained as flexible as possible and dates were chosen to coincide with the participants' release time or a suitable time after school.

Data collection timeline

The data collection took place during terms 1, 2 and 3, 2005 as indicated in Table 3.6.

Table 3.6

Data gathering timeline

Background questionnaire and interview one	Term one	12 to 13 Apr, 2005
	Term two	4 May to 16 Jun, 2005
Photo-interview	Term three	3 Aug to 2 Sep, 2005

The gap between the first and second interview was 10 to 14 weeks.

Figure 3.2. presents an overview of the data collection and analysis procedures from the initial signing of the consent form to the completion of the data analysis.

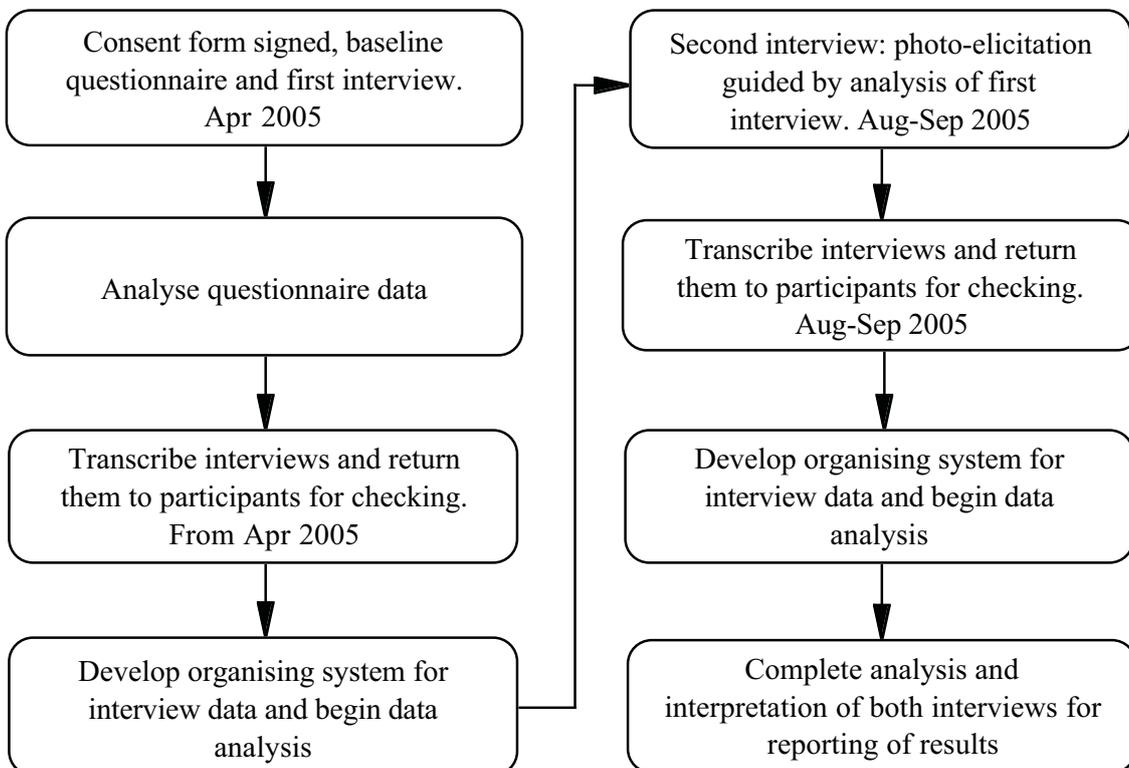


Figure 3.2. Process of collecting and analysing the data.

THE RESEARCH PROCESS

Although they are described separately, the process of collecting and transcribing interview data was iterative in the sense that transcription of completed interviews took place as new interview data were collected. This meant that my understanding of and insight into the experiences of the participants developed over time in a non-linear manner.

Consent form and baseline questionnaire

In most cases, the interview was the first time I met the participants. The meetings took place either in the participant's classroom after school or in another suitable room chosen by the participant. I gave each participant a copy of the information sheet (Appendix G) to reacquaint them with the research purpose, went over the main points and answered any questions they had. When the consent form (Appendix H) had been signed, the participant filled out the background questionnaire (Appendix D). From this information I was able to confirm information I had previously gathered about the school and expand the participant's profile. This background information also acted as a point of reference during the data analysis to verify my developing understandings. Later, this information was used to construct the descriptive portraits of my participants presented in Chapter Four.

First interview

Beginning the first interview was unproblematic because the time taken leading into the background questionnaire had served as an introduction. While the questionnaire was being filled in, I set up the tape recorder and microphone. Using the semi-structured interview schedule I had prepared (Appendix N), the interview took approximately one hour. In some cases the participants raised issues that were foremost in their mind but outside the topic. I allowed these thoughts and feelings to pass before I

THE RESEARCH PROCESS

suggested we start the actual interview. During the interview I switched the tape recorder off if an issue was of a personal nature and unrelated to the research.

At the conclusion of the interview, I told the participants that I would transcribe the taped interview and send the transcript to them for checking. I ensured they understood that they were permitted to change anything they were not happy to share or which did not accurately reflect what was said. I also stressed that a prepaid and self-addressed envelope would be enclosed and that they needed to return the transcripts in a timely manner.

In preparation for the next stage of the research—the photo-interview—I reiterated the purpose of taking the photos as outlined on the information sheet and how we would use them to talk about their classroom experiences with ICT. I also reminded them of the need to obtain consent from parents/caregivers and students before the photographs were taken. I provided the necessary number of colour-coded information sheets and consent forms to be distributed to their students and parents or guardians (Appendices I to L). I asked them to keep a record of those students who returned the signed consent forms and explained that it was important not to include in the photographs students for whom permission to be photographed had not been gained.

Finally, I provided the participants with a 27-exposure disposable camera, a CD for photos taken with a digital camera, a stamped and self-addressed envelope for returning the films to me for developing as well as an outline of the photo task (Appendix O). I thanked the participants and said I would contact them at the beginning of the following term to arrange the photo-interview. Using my research diary, I noted my own reactions, tensions that arose and important experiences as soon as possible after each interview. I drew on these comments during the data analysis to include myself in the analysis and interpretation.

THE RESEARCH PROCESS

I transcribed the interviews as soon as possible after each meeting and promptly posted the transcripts to the participants. I included a note to thank them, reminded them to check for accuracy, to make any changes they found necessary and to return the transcripts to me. I had to prompt several of the participants to return the transcripts, reminding two of them more than once. Three participants made minor changes, and one made quite a number of stylistic changes to the oral language transcribed. In all, it took two months for all but one transcript to be returned. This last transcript was returned only after the photo-interview had taken place.

Second interview: Photo-interview

It proved more difficult to get the films or CDs back than I had anticipated and some participants needed repeated reminders. As the photo-interview was to be based on these photographs, I was worried that there would be no photographs at all for some of the second interviews, which would compromise the research design. This was not a situation I had prepared for.

In one school I discovered that the participant had not commenced the process because the information sheets for parents and students stated she was a beginning teacher. Her school's policy was not to inform parents which teachers at the school were beginning teachers. Once I discovered this, I revised the forms and sent these to the participant.

In other cases I found that participants had not yet commenced taking photos and remained mystified as to the purpose of the activity despite having been given clear, step-by-step instructions about what to do, why and when. In the end, all participants had enough photographic examples of ICT activities in their classrooms for the photo-interview, some images developed from the returned disposable cameras and some digital images available on the day of the photo-interview.

THE RESEARCH PROCESS

Again, finding suitable dates and times for the photo-interview was difficult. Emails often went unanswered. Texting to the participants' mobile phones proved the most reliable method of communication. Photo-interviews were arranged for August and September 2005.

I had also prepared a semi-structured interview schedule for the photo-interview (Appendix P). After the initial greeting and finding a suitable space for the interview, we looked through the photographs and the participants chose which photographs they wanted to talk about first. This was a highly collaborative method. The participants were fully familiar with the photographs because they had taken them, while I needed to rely on their descriptions of what was happening to understand the specific context and the meaning of the activities depicted in each image. I was guided by the set of questions I had prepared in advance to ensure I probed for anything that was not mentioned in the course of the interview. The interviews were audiotaped. To contextualise what they were saying, the participants also showed me examples of students' work and in a number of cases their own and syndicate planning.

After the interview, I made notes about the issues that had come up, my own reactions and insights. I transcribed the interviews as soon as possible after the meeting to maintain my developing understanding of each teaching situation. The process of transcribing was time consuming but made me 'own' the data and gave me a sense of intimate insight into my participants' lived experiences. This was due to intense and repeated listening to the audiotaped dialogue. Both interviews were transcribed verbatim, including pauses, laughter and other non-verbal communication (see example, Appendix Q).

It has been argued that the transformation that occurs when oral speech is written down should not be ignored (Tripp, 1983). This was evidenced by participants' correction of their own speech patterns in the interview transcripts, for example the

frequent use of 'like,' and comments they made about their reactions to reading their own transcript.

Data Analysis Procedures

Data analysis can be defined as a process of making sense of data (Lincoln & Guba, 1985). Sources of data in qualitative research can take a variety of forms from observations and field notes to documents and interviews. In this research used interview data were the predominant source of data. A questionnaire was a second data source, while photographs formed a third source.

In the data analysis process, the data is ordered in a way that will facilitate understanding of what the data does and does not contain (Tesch, 1990). Analysing data from interviews essentially entails using analytical procedures to examine the meaning of people's recorded and transcribed speech using non-mathematical approaches (Maykut & Morehouse, 1994, p. 121). Questionnaire results, on the other hand, may be organised in a table format to facilitate understanding, comparison and description of how participants have responded to specific questions. Photographs as data are frequently used to support observations or field data, or as a medium to elicit information from participants, thus becoming part of the transcribed interview data. Analysis of photographs therefore depends on the way they have been used. Often they assist in confirming or, indeed, questioning an interpretation.

Methods of data coding and analysis

Data coding was guided by Tesch's (1990) methods of creating an organising system. This is a strategy for imposing order on a large set of data that is not arranged in a way that makes analysis easy. However, such a system is neither linear nor rigid:

When organizing systems serve as data management tools, there is no requirement that such structure be 'valid'; arranging one's categories is merely

THE RESEARCH PROCESS

a convenience to provide an overview over an otherwise unwieldy number of individual categories. (Tesch, 1990, p. 140)

Therefore, some categories may be clustered. Neither are they all necessarily of the same level with some subordinate to others. The boundaries of categories can be fuzzy and overlapping, and data may belong to more than one category. Research questions may provide suitable categories, as may questions in an interview schedule or questionnaire. However, as Tesch notes, “since most qualitative research is inductive, the data themselves remain the most suitable and richest source for the development of an organizing system” (Tesch, 1990, p. 140).

Data coding could now begin. At this stage, the transcripts were thoroughly familiar to me. In a sense, the analysis had already commenced, expressed in the notes I made as ideas and issues presented themselves. I also used the photographs during this phase to facilitate my understanding of, and insight into, the participants’ experiences. I used the data themselves as the source from which to develop the organising system. I first re-read a number of the transcripts, from both the first and the second interview, noting what each statement related to. I wrote the topic in the margin of the transcripts (Appendix R), and then compiled a list of all the topics I had identified up to that point. I now incorporated a technique known as the ‘constant comparative method’ (Maykut & Morehouse, 1994), where each category is compared to the others for similarity. Categories that are similar to another category or cluster of categories are merged. This method sets out to develop propositions inductively through a systematic process of analysis with the focus of the inquiry in mind.

I also wrote rules for inclusion (Maykut & Morehouse, 1994) with the aim of describing the essence of meaning for each category. These rules were written as propositional statements, that is, as statements of facts ‘grounded’ in the data. An example of a propositional statement for a category from this study is: “That beliefs beginning teachers hold about the role of ICT in schools and in teaching and learning,

influence the purpose of their classroom use of ICT.” Maykut and Morehouse argue that this procedure is a “critical step in arriving at your research outcomes” because it begins “to reveal what you are learning about the phenomenon you are studying” (Maykut & Morehouse, 1994, p. 139). The propositions that seemed to contribute to an understanding of the focus of inquiry were explored for important relationships and patterns. As a result some propositions were merged while others remained separate. This process goes back and forth as the organising system is refined and categories are applied to new data. Tesch argues that this comparing and contrasting is the main intellectual tool used achieve the objective: “to discern conceptual similarities, to refine the discriminative power of categories, and to discover patterns” (Tesch, 1990, p. 96).

I now used computer software to code the transcripts according to the organising system I had arrived at. The software TAMS Analyzer (Weinstein, 2005) was chosen for this study. The program allowed me to assemble data from the transcripts that belonged to the same category. This greatly assisted the ensuing process of analysis. In the preliminary analysis I examined the content for commonalities and differences, uniqueness, confusions and contradictions and missing information (Tesch, 1990, p. 145). At this point of close attention to the content, refining of the propositional statements and consideration of the research questions, patterns and eventually themes emerged that subsequently helped structure the presentation of the findings.

Presenting the Findings

The findings are presented in two parts in the following chapters. Chapter Four presents eight individual portraits of the participants. They are based on information primarily from the questionnaire regarding the participants’ backgrounds and prior knowledge in relation to ICT, their experiences with technology in their preservice teacher education programmes, their current school context and their access to ICT. The

THE RESEARCH PROCESS

purpose of the portraits is to enable a better understanding of the participants' experiences as beginning teachers by providing some insight into their biographical and contextual background.

The qualitative and holistic nature of the study lent itself to thematic analysis of the findings. Chapter Five thus presents the salient patterns and themes that emerged from the data analysis. This approach ensured that emergent themes not originally identified in the literature review were open to further discussion. The complexities of beginning teaching are revealed in these patterns and themes. A rich description of the complexities gives the reader an opportunity to make a personal judgment whether any of the findings might apply to other beginning teachers or to other school contexts (Maykut & Morehouse, 1994).

Chapter Summary

This chapter described the research process of the study. It discussed how the research questions were framed based on the review of the literature and on what we know and do not know about beginning teachers' experiences when they use technology in the classroom. It explained the decision-making process of arriving at a theoretical framework for the study. A constructionist epistemology forms the basis of this framework which takes an interpretivist perspective and is underpinned by a phenomenological methodology. A questionnaire, semi-structured interview and a photo-interview form the methods selected to gather the data. Ethical considerations were discussed and the validity of the research findings justified. Next the chapter outlined the research process and provided a detailed description of the process of developing the sample and collecting the data. The procedures used to code and analyse the data were also explained. Lastly the chapter described the presentation of the

THE RESEARCH PROCESS

findings in two chapters: Chapter Four, *The Participants*, and Chapter Five, *The Findings*.

The following chapter introduces the eight beginning teachers who were the participants in this study. The chapter is presented as individual portraits and provides an overview of the biographical and contextual background of each participant. Each portrait seeks to draw attention to the individual's situatedness as a backdrop leading up to the presentation of the findings.

CHAPTER FOUR

THE PARTICIPANTS

This chapter provides an overview of the biographical and contextual background of the eight beginning teachers who were the participants in this study. The overview is organised into eight portraits to illustrate each participant's particular situatedness. Several data sources were used. The portraits describe each participant's experiences with technology prior to commencing preservice teacher education, ability to use ICT on entry, and ICT skills and knowledge at graduation. Next, the chapter explains the characteristics of participants' individual schools. Finally, it describes the nature of the participants' work environment.

Introduction

This chapter presents the eight participants to the reader in the form of individual portraits. Each of these depicts the beginning teachers' biographical and contextual background to offer insight into both the personal and contextual factors in each participant's situatedness. By 'situatedness' I refer to the notion of an individual being connected to and interacting with the situation and the context. The information used to create the portraits has been drawn from the background questionnaire, school websites, school prospectuses, Education Review Office (ERO) reports and my research diary.

Table 4.1 provides a summary of the participants' schools and classroom contexts. It shows each beginning teacher's school type—rural or urban—and decile level. The class level and number of students in each participant's class are also given. Lastly, the number of computers in each participant's classroom is stated and whether the school has a computer lab.

THE PARTICIPANTS

Table 4.1

Participants' school and classroom contexts

Participant	Rural/Urban	Decile	Class level	No students	No computers in classroom	School lab
John	Rural	10	Y0-2	8	2	No
Lucy	Rural	5	Y3-4	25	1	No
Susan	Rural	10	Y7	17	3	Yes
Kay	Urban	2	Y6	27	1	Yes
Arnold	Urban	7	Y8	24	1	Yes
Annabel	Urban	2	Y2	27	1	Yes
Mary	Urban	6	Y7-8	30	2+3 laptops	Yes
Pam	Urban	5	Y3-4	24	3	No

John

Like most of the participants in this study, John was in his early twenties.³ He grew up in a city environment. He first had access to a computer in Standard 3, but it was not until he was in Form 3⁴ that the school became connected to the Internet. His family got an Internet-connected computer a year later. At John's secondary school, computer classes were compulsory. His mother used a computer at work and he learned a lot from her.

Music was John's subject study focus during his preservice teacher education, and he did not take any courses in ICT. Like all the participants in this study, he was

³ All but one of the participants were in their early twenties, that is, aged between 20 and 24. Their ages will not be mentioned in the following cases, except in the case of Mary, who was in her early thirties, that is between 30 and 34.

⁴ Form 4 students were aged ca. 14 years and Form 6 ca. 16 years. The New Zealand Form category has been discontinued and student classification is now expressed in Years beginning at Year 0 on entry into compulsory schooling and continuing to Year 13 at the end of secondary schooling.

THE PARTICIPANTS

encouraged to use ICT for Internet research, for assignments and to produce PowerPoint presentations for seminars. John was introduced to the potential of ICT in teaching in his first preservice year but reported that he only occasionally saw lecturers model technology use in the teaching and learning process. This was echoed in the extent to which ICT was used in the classroom on John's practicums.

The associate teacher in John's final practicum used ICT 'moderately often' but mostly for planning, typing straight into syndicate planning template, and for reports. John was not encouraged to incorporate ICT in his own planning on his final practicum. He rated both his level of technology use with students and his own professional use at this time as 'a little.' On graduation, John assessed his level of technical skills and experience with ICT as 'fair' and his level of pedagogical skills and experience with technology as 'moderately experienced'.

John joined Ashgrove School⁵ at the beginning of term 2. The full primary decile 10 school had a roll of approximately 20 students. The school's website stated that the school had one computer for every five students with all computers linked to the Internet. Students also had access to a fax machine, scanner and digital camera to enable them to create and publish their work independently, according to the Ashgrove School website. ERO⁶ reported in its last review of the school, before the data gathering commenced, that the Board of Trustees had funded computers for student use and that students were using them for classroom research. When John joined the school, email could no longer be accessed in the classrooms, but this was 'in progress.' He learned that the board of trustees was fundraising to replace the senior students' computers with laptops and to install a school network.

John taught a class of eight Y0-Y3 students, most of whom lived on farms. There were two classroom computers and a number of CD-ROMs. Whilst the classroom had

⁵ All the participants' schools have been allocated a pseudonym.

⁶ In all instances, where ERO review reports have been consulted, the year of publication has been omitted to protect the school from being identified.

THE PARTICIPANTS

no Internet access, John was able to use the office computer which was connected to the Internet. Because of the small class size, he would sometimes take the children to the office to use the Internet as the secretary only worked two mornings a week.

Lucy

Lucy grew up in a city environment. During her own school years she did not have access to a computer at home. Her classroom got a computer when she was in Standard 2.⁷ She remembers that it was always exciting to come to school and learn about it. She took Text and Information Management (TIM)⁸ courses right through secondary school from F3 to F7 and believed that these experiences gave her a good foundation in ICT. Lucy chose technology as her subject study focus in her preservice teacher education, where one area for study was ICT. She also took the two elective ICT courses: a multimedia course and one focussing on ICT use in the classroom.

Some lecturers modelled ICT use, mostly by using PowerPoint presentations. Sometimes they encouraged the students to present their information in PowerPoint format and recommended Internet searches. On practicum, Lucy's associate teacher used technology quite frequently but mostly for professional purposes such as planning, assessment, reports and meeting notes. She encouraged Lucy to use ICT in the classroom. However, mostly children played games on the computers rather than using technology meaningfully in curriculum topics.

Lucy began her teaching career at a recently merged, 5-teacher rural school, where she was the only beginning teacher. Cypress School was a contributing decile 5 school with a roll of over 100 students. Most staff members at Lucy's school were new

⁷ The New Zealand student classification system has changed and Year classification is now used. Standard 2 is equivalent to Year 4 for students aged about 8 years.

⁸ This subject area is currently part of the National Certificate of Educational Achievement (NCEA) system of qualifications for Y10 – 12. The learning outcomes for Level 1 are focused on demonstrating practical skills, for example competent text entry techniques, using an alpha-numeric keyboard, the use of various Microsoft products, and accessing, processing and presenting information from various sources.

THE PARTICIPANTS

due to the merger. Lucy began her first year teaching a Y3-4 class of 25 students. Most students were from a farming background.

The school website stated that a computer suite with 12 computers was available. However at the time of data gathering the computer lab was not being used due to the age of the computers and lack of a network. The school provided laptops for most of the teachers, who could plug them in at the office to print files. If required, the teachers' laptops could be used as a pod by the senior class. The school employed an outside ICT specialist for one day a week to teach staff and also to work with students.

Susan

Susan grew up on a farm and was active in sport. She first had access to a computer at home during her primary school years. At intermediate school she also had access to Internet-connected computers. Susan's family got Internet access when she started secondary school, where she took an information technology class.

As Susan had completed a BSc, she qualified for the 2-year teacher education programme. She did not take any elective courses in ICT and she believed that was not an option in her programme anyway. Susan was required to present all her assignments typed and apart from experiences with a learning management system, she rated her overall experiences of lecturers modelling ICT use in classes as minimal.

Susan reported seeing children using computers 'moderately often' on her practicum. A roster was used throughout the day in one classroom. The children could use the computer no matter what subject was being taught. However, she never saw her associate teacher use ICT himself. She was encouraged to incorporate technology in her planning on one practicum. She set up an email pen pal arrangement with students in Niue for a technology study about personal communication using ICT. Susan considered her level of technology use with students while on practicum as 'a little' and

THE PARTICIPANTS

her own professional use as ‘moderately often.’ Overall, on graduation Susan rated her level of technical and pedagogical skills and experiences with ICT as ‘moderately experienced.’

Susan’s first teaching appointment was to Acacia School, a full primary school of 200 students. This decile 10 school had a substantial and regularly updated website. Here the Board of Trustees expressed their commitment to ensuring that ICT resources were both current and integral to learning: for example, a computerised library issues and search system; two or three modern computers in each classroom with high quality educational software; a specialist computer suite; and Internet access to all classrooms. The website included a Y7-8 prospectus, the area in which Susan was teaching. It highlighted the small classes in the senior school, extension opportunities and that senior students would receive instruction in ICTs. Other ICT-specific resources included an ICT Teacher Aide, according to the Acacia School website. The school was fully networked. Students had to sign a computer use agreement to use the Internet. The school also had student safety rules and unsuitable sites were blocked by a filtering system.

Susan taught a Y7 class of 17 students. Her classroom had three computers and the students could also use Susan’s laptop. The students did not have individual email addresses, although Susan believed they probably could have. They did have a class email account and class folders on the server.

Kay

Kay’s first experience with computers began in her first year of secondary school, where she took a computer technology class. The following year the family got an Internet-connected computer at home and her secondary school was connected to the Internet soon after.

THE PARTICIPANTS

Kay rated her lecturers' modelling of ICT in classes as 'occasionally.' It was only in her final year practicum that she got an opportunity to learn about using ICT for teaching and learning. She saw students use technology 'moderately often' while her associate teacher used ICT 'frequently' in literacy programmes. She was encouraged to include ICT in her planning, which she did 'moderately often.' She also reported using technology 'moderately often' for professional purposes. Kay rated her level of technical skills and experience with ICT as 'moderately experienced' at the end of her preservice teacher education and her level of pedagogical skills and experiences with ICT slightly higher.

Kay taught at Totara School, a contributing, metropolitan, decile 2 school with a roll of approximately 400 students with a high transient trend. Kay started with 27 students in her Y6 class but student numbers had dropped and attendance was poor. On any given day there might be as few as 20 students in the classroom.

The school prospectus noted the multicultural nature of the school and that a number of students had English as a second language. An ICT learning centre—a computer lab—and the use of computers and technologies supported the school's innovative curriculum programmes across the curriculum (Totara School prospectus). A full-time ICT specialist maintained the computer lab. Kay had a school laptop computer, which she had been able to use since the beginning of the year. She had only one classroom computer, which was connected to the server but not to the Internet due to a 'missing plug.' Totara School was networked.

The school had a strict ICT acceptable use policy (AUP). It required parents to authorise that their child was permitted to use a computer to access the Internet and to have their photos taken. Without a signed consent form, students were not able to use the computers.

THE PARTICIPANTS

Arnold

There was no computer at home while Arnold was growing up and his main interest was sport. Although there were Internet-connected computers at both his intermediate and secondary school, he had not used a computer before he began his preservice teacher education. He slipped through the institution's computer competency test because he was absent on the day of the test. He eventually learned to use a computer out of necessity from his peers in the computer lab, because his lecturers insisted that his assignments be word-processed. He also used PowerPoint and digital still cameras as well as video cameras.

Arnold rated the extent of his lecturers' modelling of ICT use for teaching and learning as 'frequently,' echoing his experiences of student use of ICT while on practicum. While Arnold observed his associate teacher using technology frequently on his final practicum, this was mostly for planning. He was not encouraged to incorporate ICT in his own planning, but nevertheless reported using technology with students and for his own professional purposes 'moderately often.' On graduation, he considered his level of technical and pedagogical skills and experience with ICT as 'fair.'

Arnold's Oakhill School was a full primary decile 7 school of nearly 500 students. The school's prospectus stated, "Students have access to a fully networked computer system and computer suite with access to e-mail and the internet."⁹ The prospectus also outlined a range of essential skills expected of its Y8 students, for example, that students would be competent in using a variety of ICTs to communicate, and in using ICT effectively to seek information. In terms of the beginning teachers' advice and guidance programme, the 2003 ERO report on Oakhill School noted: "The

⁹ To protect the identity of the school, the prospectus is not named.

THE PARTICIPANTS

principal and syndicate leaders have improved the systems for providing support to beginning teachers.”¹⁰

Arnold taught a Year 8 class of 24 students. His appointment to this class level was a challenge, because most of his practicums had been at the lower class levels of the primary school.

Each class was allocated an hour per week in the computer suite, or more if the suite was not being used. Digital still cameras and video cameras were also available. As a permanent teacher, Arnold was eligible for a laptop through the Laptops for Teachers Scheme (TELA).¹¹ Arnold let the students use his laptop to optimise computer access in the classroom, which had just one computer for student use.

Annabel

Annabel grew up in a small provincial city. She had a computer at home her from primary school years. At secondary school she took a class in Information Management and was a competent computer user before she began her preservice teacher education.

Annabel’s subject focus was health. She was introduced to the potential of ICT for teaching and learning in the first year of her preservice teacher education. She was encouraged to use technology for research but did not often see lecturers model the use of ICT. Annabel’s associate teachers in her final practicum used technology mostly for report writing and she rarely saw her associate model ICT use in the classroom.

She took an elective class in ICT in her final year. On her final practicum, she used ICT ‘moderately often’ with students and ‘very often’ for her own professional

¹⁰ Bibliographical information about the reviews has been withheld to protect the anonymity of the school.

¹¹ From 2003, all permanent full-time and part-time teachers working at least 12.5 hours in Y7 and 8 classes in state and integrated schools became eligible to apply for a laptop under the TELA scheme, expanded to include Y4 to 6 teachers. Under the scheme teachers are reimbursed approximately two thirds of the cost of leasing a laptop. Long-term relievers on fixed-term appointments are not eligible [<http://www.minedu.govt.nz/index.cfm?layout=document&documentid=8568&data=1>]. The purpose of the scheme is to give teachers the opportunity to develop confidence and competence in the use of ICT.

THE PARTICIPANTS

purposes. Annabel summed up her level of technical skills and experience with ICT at graduation as ‘very experienced,’ while she reported her level of pedagogical skills and experience as ‘moderately experienced.’

Annabel taught at Totara School, a metropolitan decile 2 school. Her school had a roll of 400 students, who were predominantly Māori and Pasifika with a number of students from other ethnic groups. The school had a staff of 17 teachers of whom three were beginning teachers. Internet access at the school consisted of an ICT suite of 15 modern and networked computers with access to the Internet (Totara School website). A technician managed and maintained the computer lab, and he also looked after problems with the teachers’ laptops. Classes were allocated time each week. In addition, each classroom had at least one computer connected to the intranet, and teachers and students could access their class files stored on the server.

A new feature in the computer lab was an interactive whiteboard, and teachers had participated in ICT professional development to learn how to use it. Other resources available in the ICT suite included digital cameras and other peripherals. Students’ work was displayed on the walls.

A recent ERO report stated that the school’s ICT programmes provided opportunity for students to develop confidence and familiarity with computers and to develop investigative skills in authentic contexts. It also reported that the school was providing strong support for beginning teachers with good programmes that were based on their needs.

Annabel taught a Y2 class of 27 students. At the beginning of the year she had just one computer and the students rarely used it.

THE PARTICIPANTS

Mary

Mary was in her early thirties and a little older than the other participants. She first had access to computers and the Internet at home, when she was in Form 4, and at school in Form 6. However, Mary had no real learning experiences with ICT at secondary school. She took an Arts degree at university before taking up a position as an educator in her field. At that point she described herself as 'ICT phobic' but it was in this job that she learned to use technology.

Mary's subject study focus in her two-year preservice teacher education programme for graduates was mathematics and social studies. She had a block course in technology of which ICT was a small part. She had no other options for learning about using ICT in teaching and learning because her course was compressed into two years. She accessed Internet-based notes for her courses, used PowerPoint presentations and communicated through email.

Mary saw ICT modelled quite often by lecturers, but seldom saw technology being used in classes while on practicum. Her associate teacher had used ICT for report writing. It was her lecturer who encouraged her to use ICT on practicum, though she did not get the opportunity to implement the unit she had planned. She rated herself 'moderately experienced' when she graduated, reporting no change from the time she entered.

Mary's first appointment was to Sycamore College, a Y7-13 secondary school. The roll of nearly 900 predominantly Pākehā students were drawn from a mix of urban and rural schools. The school had more than 70 teachers and amongst them were several beginning teachers. This decile 6 school had a regularly updated website, three computer labs and a library information centre. All computers were networked. The organisation of teaching and learning at Sycamore College was based on subject specialisations, each with its own department. That made it more difficult for a class

THE PARTICIPANTS

teacher at the intermediate level to know what the students were learning in other classes.

Mary taught a Y7 class of 30 students and was responsible for their learning in English, maths, social studies and health. The Y7 and 8 classes were located in their own area within the school grounds. Mary had a laptop through the Laptops for Teachers Scheme (TELA). ICT access in her classroom consisted of one classroom computer and several more in an adjoining shared space: the hub, where a fax/phone was also available. The students could also use the computers in neighbouring classrooms if they were not being used. The classroom had a data projector, TV, a video player and a CD player permanently installed, which Mary used especially in teaching social studies and health. The students had their own logins, a folder for storing their documents and their own email address. Her class had 6-week blocks of weekly ICT sessions in the computer lab with a specialist ICT teacher but Mary had no input into these modules and did not know what was covered.

Pam

Pam first began to use a computer in Standard 3. At secondary school the school's computers were connected to the Internet. Pam's family got the Internet in her second year of secondary school. She took typing in Form 3 and 4. She spent a year working when she left school and developed many ICT skills through her work.

Pam took a 3-year preservice teacher education programme, which specialised in the teaching of students between 0 and 8 years of age. While she did not have ICT as a subject study focus, she did have a specific focus on ICT in her Technology classes. Informal learning about ICT was in the form of assignments that had to be typed, using the Internet for research and for making resources. Pam was first introduced to the

THE PARTICIPANTS

potential of technology in teaching in her second year. In the background questionnaire she rated the lecturers modelling of ICT use as ‘moderately often.’

Pam reported technology to be used ‘frequently’ in her practicum classrooms. She also rated her associate teacher’s the level of ICT use as ‘frequently’ on the final practicum. However, this was mostly for professional purposes such as report writing, publishing work and Internet research. Meanwhile, students played games and did Internet research. Pam was encouraged to incorporate technology into her planning and found it “useful to see how I adapted and used ICT” (Background Questionnaire). On her final practicum, she used ICT very often both with students and for professional purposes. On leaving her preservice teacher education, Pam summarised both her level of technical and pedagogical skills and experience ICT as ‘moderately experienced.’

Pam took up a position at Mulberry School at the beginning of Term 2. The school was a contributing decile 5 school with a roll of almost 400 students. The school’s website stated that it was recognised for its innovative use of ICT and that it had, for example, entered in national video competitions. The school was widely known as a pioneer amongst schools in the city for using computers in teaching and learning. It had an intranet which could be accessed from all computers and workstations in the school. The school did not have a computer lab but a pod of wireless laptops.

Pam taught a Y3-4 class of 24 students. She had three computers in her classroom, connected to the school’s network. The library catalogue could be accessed from the classroom via the network.

Chapter Summary

This chapter provided an overview of the eight participants’ biographical and contextual backgrounds presented as individual portraits. It described their personal experiences with ICT before entering preservice teacher education, their self-reported

THE PARTICIPANTS

ability to use ICT on entry into preservice teacher education, and their views on their skills and knowledge in ICT at graduation. The portraits showed that all but one participant were in their early twenties, had diverse prior experiences with technology and that a small number had taken courses in ICT during their preservice teacher preparation. Few said they had observed an experienced teacher use ICT for teaching and learning or used technology themselves with students while on practicum.

The portraits also served to illustrate the situated nature of each beginning teacher, for example, class size and access to ICT resources, and were prepared from several data sources, for example, the background survey and school websites. An overview of the participants' school and classroom contexts was provided at the outset. The importance of such contextual information was highlighted in the literature which indicated that prior knowledge and context both strongly influence teachers' practice. The portraits will therefore assist understanding of the individual participant's experience when interpreting and reflecting on the findings.

The following chapter presents the findings of the research organised into seven salient themes that emerged from the data analysis. The qualitative and holistic nature of the study lent itself to thematic analysis of the findings rather than a more conventional linear account of the results under the main research questions. This approach ensured that emergent themes not originally identified in the literature review were open to further discussion.

CHAPTER FIVE

FINDINGS

This chapter presents the findings from analysis of the data collected through a background questionnaire, a semi-structured interview and a photo-interview. It expands on the biographical information given in the individual portraits presented in the previous chapter. The chapter identifies similarities and differences in the challenges the participants encounter when they use ICT in teaching and learning, and reports on patterns that may inform our understanding of their experiences. The findings are presented thematically. Quotations from the data are included to ensure the authentic voices of the participants are heard. The chapter presents the themes that emerged from the data analysis under the following headings: awareness of ICT policy, views on the role of technology in schools, beliefs about schools' expectations for technology, concepts about ICT in classroom practice, school culture and mentoring, experiences that contributed to perceptions of competence in technology, and, finally, reflection on the participants' experiences with technology in their preservice teacher education. The chapter concludes with a summary of the findings as a whole over the two chapters.

Troubled by impersonality, by abstract vantage points, I wanted people to name themselves and tell their stories when they made their statements. I came to believe (or I was taught) that “reality” referred, after all, to interpreted experiences. (Greene, 1988, p. xii)

Introduction

The previous chapter presented portraits of the individual participants and their prior knowledge and use of ICT. They were based on a questionnaire, school websites, school prospectuses, Education Review Office (ERO) reports and my research diary. This chapter presents the findings of the study: a qualitative investigation into eight beginning teachers' experiences with ICT. The data gathering consisted of a background questionnaire, a semi-structured interviews and a photo-interview. The

THE FINDINGS

interviews were transcribed and analysed using a systematic process of coding. The resulting categories were merged where commonalities existed and eventually emerged as themes. The findings in this chapter are presented under these themes consistent with the qualitative nature of the study rather than as a linear account with the results presented under the main research questions. This approach ensured that emergent themes not originally identified in the literature review were open to further discussion.

The findings are organised under the following headings: (a) awareness of ICT policy; (b) views on the role of technology in schools; (c) beliefs about schools' expectations for ICT; (d) concepts about technology in classroom practice; (e) school culture and mentoring; (f) experiences that contributed to perceptions of competence in ICT; and (g) reflections on technology in their preservice teacher education.

Awareness of ICT Policy

Despite extensive efforts on the part of central government to promote the use of technology in schools, it was noteworthy that none of the participants were aware of, or familiar with, the national ICT strategy (Ministry of Education, 2003). When asked whether they were acquainted with the policy, most answered with an outright 'no' or 'not really.' Thus, the findings reveal a serious gap in the beginning teachers' knowledge of educational policy in this area at a national level.

At the school level, aims for technology and how they are to be achieved are usually outlined in schools' curriculum delivery plans and in specific ICT policies. Yet, most participants did not know, or were unsure, whether their school's curriculum plans included technology. They either did not know whether their school had an ICT policy, or they simply could not say what these documents contained. At a practical level, Kay knew that her school had a comprehensive acceptable use policy for Internet use. Lucy and Annabel were sure their schools had an ICT policy, but were unable to report what

THE FINDINGS

it said. In contrast, John was sure his school did not have one, while Pam pointed to her syndicate's ICT integration plan, which its members developed each term. Again, this finding highlights an important gap in these beginning teachers' understandings of the local context and purpose of ICT in their schools.

Views on the Role of ICT in Schools

In their emergent practice with ICT, most participants used a mix of the rationales noted in the literature review to explain the role they perceived technology to have in schools. An overview of their views is presented in Table 5.1.

Table 5.1

Participants' views about the role of ICT in schools

Name	Overriding metaphors 'ICT world' and 'ICT is the future'	Social rationale (‘Computer awareness’ rationale)	Vocational rationale	Pedagogical rationale ICT makes contribution to teaching and learning	ICT enhances learning	Practice ICT as an add-on
Arnold			✓			✓
Lucy	✓	✓		✓		
Annabel	✓					✓
Kay		✓	✓	✓		
Pam	✓	✓		✓	✓	
John	✓	✓	✓	✓		
Susan	✓	✓	✓	✓	✓	
Mary	✓	✓	✓	✓	✓	

The mix suggests that participants' views of the role of technology in schools at the time of the study were fragile and still not fully developed.

THE FINDINGS

The overriding metaphors used by the participants to explain and justify the use of technology in schools related to its pervasiveness in society and its anticipated future omnipresence. Examples of such metaphors were: “ICT is a huge part of everything already” (Susan) and “the way the world is going” (Annabel). Mary, furthermore, argued, “The reason that so much money is now available for ICT is the future!” (Interview 1), linking technology to a political and economic context.

There is evidence to suggest that their perceptions were shaped to a large extent by their own participation in wider social, economic and cultural spheres. It was therefore not surprising that most participants—most were young people themselves—expressed a social rationale based on the belief that as computers had become normalised as part of contemporary life, schools should make sure young people are equipped to use them:

ICT has a very important place now. I don't know that any of my students don't use it at home now. We need to move into ICT because it's basically a big part of our lives now. (Mary, Interview 1)

Five of the eight participants believed that teaching and learning experiences with technology should prepare students for their future world of work. Foremost amongst those who held this vocational rationale was Arnold, who had work experience before he entered preservice teacher education:

There are more and more computers in the workplace, and they definitely need them in schools . . . The workforce is just computer orientated and it's just getting more and more towards that way, so I think they need the skills there for that. (Arnold, Interview 1)

Arnold's view clearly focused on skills acquisition as preparation for the workplace. He distinguished between computers being used for games and their use as a 'tool' for what he saw as more serious and real-world pursuits:

I think a lot of children have access to games and all that, but at school you can actually teach them that they are not just for games. They are for research . . . you can teach yourself, you can just use the tools there—all the tools

THE FINDINGS

except for games, and that shows them there is something other than games, and just the use of equipment like even video cameras, digital cameras, the use of that and editing gets them ready for the workplace or tertiary study. (Arnold, Interview 1)

Arnold was the only participant to focus solely on skills acquisition in his classroom practice with ICT. To a lesser degree, Pam and Mary also expressed a vocational rationale but in the context of “education as making successful people” (Mary, Interview 1). Like Arnold, Pam and Mary also had work experience before they commenced their preservice teacher education.

Four participants made a connection between ICT and its contribution to teaching and learning. However, in most instances this link was couched in technocentric language and underpinned by a perception that ICT was of intrinsic value to student learning. The following excerpt provides evidence of their latent technocentrism:

I also use the computer as a reading station, as well. Like, we have a really good program called “Reading Blaster” and occasionally at maths time I give them some really good programs to put sentences in order and stuff. (John, Interview 2)

Kay stood out in arguing that ICT had motivational value. She demonstrated a fragile and emerging view about the affordances of ICT for her students, for example in the opportunity to interact with contemporary media:

It does help them look at the bigger picture. I mean, you can have books and things, but when you see it on the computer, and it is more interactive and you can go into sites that have more moving objects and things like that, I think that’s more motivational. (Kay, Interview 1)

Later, Kay expanded on her view, developed from her experiences teaching a class of Y6 students despite little ICT access in the classroom:

Kids do switch on to English and switch on to literacy when it comes to computers and, therefore, I think it is quite a good tool to use computers in literacy. For example, those spelling games are great. (Interview 2)

THE FINDINGS

Three participants expressed a more resolute pedagogical rationale: a view that ICT had the potential not only to contribute to, but also enhance, student learning. An example is Pam's reply to my rhetorical question whether having a computer makes a teacher better:

Well, it doesn't enhance the teacher. If anything, it might enhance the learning, which is different to enhancing the teaching, because it's supporting the children, which is, in effect, enhancing their learning—making their learning grow. (Interview 1)

In stark contrast, Annabel and Arnold held a more one-dimensional perspective on the role of ICT in schools, explicitly viewing ICT as an add-on to their classroom practice. Annabel illustrated this in the following quote, explaining her belief that ICT was something to be fitted around other curriculum commitments:

To be honest, as a beginning teacher I don't think it is the biggest worry whether you teach it or not, you know what I mean? Like, whenever you have done everything else, you think, "OK, now I'm ready to get into ICT." (Annabel, Interview 2)

Susan was the only participant to mention the need for students not to be afraid of how computers work. Her school operated its technology programme on a broader foundation than is typically the case in most primary schools. Students were encouraged to develop knowledge of the technical aspects of computers, for example programming:

Everything is going into ICT at the moment, so I think that it is important that schools do teach the kids about the process of it—how things are made up, how—with problems—what that problem could be, where you go for help—those sorts of things. I would like to do something with designing programs and things like that because I think there's going to be a lot of that in the future. And just, mainly, getting the kids familiar with it and not being scared of them. Because you can't have kids scared of them. (Susan, Interview 1)

Susan's statement is underpinned by her self-efficacy beliefs and actual competence with computers. It is fair to say that few teachers are likely to have the technical problem-solving skills and confidence Susan expressed.

THE FINDINGS

In summary, the participants' views about the role and priority of ICT in schools were expressed as a mix of the rationales explained in Chapter Two, the literature review. A group of recurring metaphors related to social and future rationales were expressed by most of the participants: namely, that technology is pervasive in society now and will continue to be so in the future, and that schools would therefore do well to ensure that ICT played a part in teaching and learning in the classroom. A second dominant view was a vocational rationale, which holds that ICT should prepare students for the world of work and study. Most participants perceived that technology had the potential to contribute to teaching and learning. Only three expressed a more specific pedagogical rationale by articulating a stronger link between ICT and student learning. In contrast, two participants viewed technology as an add-on to the curriculum and classroom learning. Importantly, the participants' views were uncritical and lacked depth and breadth in the way issues of pedagogy and content knowledge were articulated. While this may be as a product of their relative inexperience, their views did not reflect an understanding of technology in the broader social and political context of schooling.

Beliefs about Schools' Expectations for ICT

The expectation that beginning teachers will use technology was another common theme, and all but two participants said that this was expected of them. Irrespective of their individual knowledge and skills with ICT, they were encouraged or expected to use technology as much as possible in their classroom programme. Frequency was stressed. The following interview extract illustrates this point:

That I integrate it into my learning programme, and that I do it at least once or twice a week, and we have allocated times to do that. Yeah, I think they are really just pushing for integration of ICT and getting kids to start learning it and knowing about computers. (Kay, Interview 1)

THE FINDINGS

These participants' beliefs about what was expected of them focused on the technology and when or how much to use it. There was acknowledgement of pedagogical goals for ICT use. This suggests another important gap in the beginning teachers' understanding about the use of technology to support the curriculum. It may also indicate that the beginning teachers were not receiving appropriate mentoring.

Pam and Susan's schools were widely recognised for their innovative use of ICT. In these schools it was expected that teachers' intentions for using ICT in the classroom were linked and aligned to learning plans and objectives. Susan's beliefs about her school's expectation are expressed in this interview excerpt:

Expectations? Ooh, it was a big thing. Like in our planning, we have a whole section on our form for ICT, how on every plan—how you are going to incorporate ICT into the programme. (Susan, Interview 1)

Pam and Susan's experiences as ICT using beginning teachers stood apart from the rest of the participants in their schools' direct support for the meaningful use of technology. In contrast, John and Mary said their principals or syndicate leaders had never mentioned technology. While John was given no specific indication of the learning intentions for ICT in his two-teacher school, he had, however, canvassed the subject himself:

Because there's only the two of us, and I know the principal is not huge on ICT, I will . . . get the kids to make a website of their own, like as a class. . . . She thought she'll take my eight and I'll take her kids. . . . We can take pictures of the work they have been doing and they can put . . . some of their writing and stuff like that and, like, email the link to the parents and their grandparents and friends and stuff so they can come and see what's happening in the class. The principal thought that was a good idea, so I guess I will be doing that. And the previous teacher who was here did the school website, so once I figure out how to do it I think I will do that job as well. (Interview 1)

On noticing the technology equipment in his two-teacher school, John had taken a leadership role and suggested ways ICT could be used. He expressed no hesitation in

THE FINDINGS

taking on this role and gave the impression of being confident that he would succeed in implementing his ideas.

Mary, who taught in the intermediate section of an Y7-13 school, described her impression of what was expected of her with ICT as follows:

No. I'm not too sure. It's harder in these environments because we're departmentalised. . . . The specific ICT focus comes in their module [with the technology department], where they actually go to a room full of computers and where they all have one each. (Interview 1)

Mary was removed from her students' learning experiences with technology by the organisational arrangement of ICT as a separate area of study with specialist teachers. Surprisingly, she did not know what her students were learning.

From these data we can observe that whilst four participants were aware of the general expectations of them in regard to ICT, their focus was technocentric and they appeared to consider the frequency with which technology was used to be the main aim.

Conceptions of ICT in Classroom Practice

An analysis of the participants' discourse about ICT provided insight into how these beginning teachers thought about their use of technology in teaching and learning. As described in Chapter Two, Meskill, Mossop, DiAngelo and Pasquale's (2002) four continua of teacher-development in ICT may have the potential to facilitate interpretation of teacher thinking and action in this study. The continuum comprised teacher thinking and action within each of four dimensions: locus, focus, practice and emphasis (Meskill et al., 2002).

Table 5.2 reveals differences as well as consistencies and inconsistencies in the participants' concepts about technology.

THE FINDINGS

Table 5.2

Conceptions of ICT held by individual participants

Name	Locus		Focus		Practice		Emphasis	
	Machine	Learner	Self	Student learning	Managing Students	Empowering Students	Product	Process
Arnold	✓		✓			✓	✓	
Lucy	✓		✓		✓		✓	
Annabel	✓		✓		✓		✓	
Kay	✓		✓		✓			✓
Pam	✓	✓	✓	✓	✓		✓	✓
John		✓		✓		✓	✓	✓
Susan		✓		✓		✓		✓
Mary		✓		✓		✓		✓

The strengths and limitations of this analytic approach will be considered in the discussion chapter.

Locus

The two contrasting end points of the machine/learner continuum indicate where the locus of agency in the learning process is believed to reside. The conception of the machine as locus of agency attributes the ability to facilitate or create learning to the technology. On the other hand, to conceive the learner as the locus of agency suggests that a sociocultural context is important and that the learner plays an active role.

As illustrated in Table 5.1, several participants expressed the notion of the machine as the locus of learning. The following comments are examples that illustrate

THE FINDINGS

this point: “They want to be on the computers instead of writing in their books” (Kay, Interview 2) and “It does lots of work for you and finds information for you” (Annabel, Interview 1).

John, Susan and Mary, on the other hand, perceived the learner as the locus of agency, as demonstrated by these observations: “When I ask them to look something up on the Internet, some are really keen to do it and others are really shy” (Susan, Interview 2) and “I did expect them all to use web searches at some stage in their project” (Mary, Interview 2).

Pam focused both on the computer: “Sometimes I will put a reading group on the computer” (Interview 1), and on her learners: “I may teach new things to children who are ready for it” (Interview 1).

This analysis of the participants’ thinking about the locus of agency reveals a stark contrast in their views with the exception of Pam, whose account was inconsistent and encompassed both ends of the continuum. As we will see, Pam maintained this inconsistency in three of the four continua.

Focus

Self-focus on the self/student learning continuum refers to the teacher’s thinking and action focusing on self. A self-focus was evident in the way half the participants described their actions in relation to ICT use. As reported by Arnold and Annabel: “I can have two on the Internet” (Arnold, Interview 1) and “It was my personal goal that they use it more” (Annabel, Interview 1). From these interview extracts we observe a focus on self, combined with an emphasis on machine, suggesting a technocentric conception of ICT.

In contrast, several other participants focused on student learning, as evidenced by the way they talked about ICT. John explained, “These programs have high frequency words, using the mouse, typing a word—just the things 5-year-olds need to

THE FINDINGS

learn” (Interview 2). Susan also appears to have a focus on student learning as evidenced by her emphasis on pedagogical strategies: “They each wrote a postcard about . . . what they had learnt” (Interview 2).

Pam’s actions, however, were harder to classify. She expressed mixed conceptions as the following two quotes illustrate. On the one hand, she reported, “The children love it because it’s a game, but it’s reinforcing what they have learnt” (Interview 1), but later she continued, “I still don’t use them as much as I should” (Interview 2). Thus, Pam demonstrates a fluctuating focus between her own actions and student learning evidenced also in the locus analysis.

Although there is still a need to establish the validity of this binary conception, we nevertheless observe a pattern. In the locus analysis, the same participants who previously focused on the learner, now report a focus on student learning. In contrast, the participants who previously focused on the machine, now report a focus on self.

Practice

The managing/empowering students continuum describes two contrasting teacher practices. The literature on beginning teaching suggests a pre-occupation with classroom management in the early years (for example, Athanases & Achinstein, 2003), while teaching practice that empowers students denotes shared authority and students being actively involved in their learning.

The findings showed that a number of participants’ practice focused on managing students’ use of technology. This was demonstrated in the way they described their interaction with students and the classroom computers. The following interview extracts clearly illustrated this: “Oh, you haven’t had a turn for a while, you can go on it now” (Kay, Interview 1) and “Sometimes the ‘early finishers’ get to go on it” (Annabel, Interview 1). In these examples, Kay and Annabel used the computer variously as a reward or a turn-taking activity irrespective of purpose and need, while Lucy managed

THE FINDINGS

her student by removing his agency. The key point is that there is evidence of a disconnect between the teachers' actions and the learning process. Notably, Kay revealed awareness that some of her actions were inconsistent with her own notion of good practice when she remarked:

But then sometimes it really frustrates me. I know it's really bad to say but sometimes you say to them, "Well, if you are going to be naughty you won't get to go on the computer." You are not supposed to say that, but you use it. (Kay, Interview 2)

Other participants demonstrated a practice that placed emphasis on students being actively involved in their own learning, for example in making choices and emphasising social skills. This type of belief was expressed by Susan and John, "They decided how to display the information they had found" (Susan, Interview 2) and "The Y2 buddy, the more senior one, is on the other computer. They are really good at helping each other" (John, Interview 2). In the context of the Internet, Mary conveyed similar sentiments:

My extension spellers have websites they go to and do word challenges. They also have 'Websites we like'; they just love it and bring stuff from home . . . so that's exceeding expectations because they really ran with that. (Interview 1)

These last three interview extracts provide evidence that Susan, John and Mary put students at the centre of their concern. Power, knowledge and authority were shared. Conversely, the earlier quotes by Annabel, Kay and Pam showed that classroom control resided with them as they focused on managing student behaviour.

Emphasis

The final category focuses on emphasis in teachers' use of technology in teaching and learning. The continuum spanned from emphasis on product to one on process. Those who expressed an emphasis on product over process included Annabel, who said, "Someone goes on the computer and type up their story" (Interview 1).

THE FINDINGS

Meanwhile, Lucy emphasised skills development as was evidenced in the following comment:

He has given us a checklist, like, turning the computer off and on; whether the children can open a program from the Start button if it's not on the desktop; what they can do in Word—just basic things that they use and need. (Interview 2)

Again, several participants expressed a disconnect from the learning process.

However, Kay demonstrated a shift in emphasis from product to the learning process when she said:

The kids had to design a storyboard of their own narrative and then put it into the form of a PowerPoint. They had . . . to retell their story in different pictures. . . . We had studied old fairytales and about characterisation and things like that beforehand. . . . They got too carried away with doing their pictures and lost the thought of “Does this make sense?” (Interview 2)

Meanwhile, Pam again presented a mix of emphasis on product and process in relation to her use of technology. She first articulated an emphasis on product: “The ICT checklist is my assessment, too, and once they have done it and I am happy that they have done it independently, I will mark it off on my sheet” (Pam, Interview 2).

It has to be said that the ICT checklist was part of the way the syndicate worked and also contained items that emphasised process:

We have daily news on the intranet. Children take turns opening it and reading it to the class. We also have a weekly quiz and the children can email their answers to the principal (Pam, Interview 2).

These two contrasting quotes by Pam highlight the danger of accepting at face value a strict dichotomy in the measures of the beginning teachers' orientation. Accepting the validity of this measure, it would appear that Susan and Mary were process-oriented in their emphasis on technology use. For example, Susan described the evaluation of an activity that incorporated technology as follows: “I looked not only at their presentation but also at things like their note taking” (Interview 2).

THE FINDINGS

While the validity of these binary distinctions remains problematic, we nevertheless observe a repeated pattern with one group, in the main, operating from a teacher-centred orientation and the other predominantly from a student-centred one.

What can we conclude about the participants' concepts of ICT use?

The analysis of the participants' responses illustrated that some participants found it difficult to focus on learners and the learning process when using technology in their classroom practice. Lucy and Annabel, who had the most experience with technology, demonstrated this. They had both taken Text and Information Management (TIM) at secondary school and were the only participants to have taken ICT as a subject study in their preservice teacher education. They had few models to guide them as technology-using teachers. Neither had experienced their associate teachers use ICT with students, and students' use had mainly been games and publishing from edited text. Both rated themselves as 'very experienced' on graduation. However, their accounts of using ICT in their classrooms strongly indicated a technocentric conception of technology that was disconnected from the learning process. Notably, Lucy reported using a checklist of computer skills devised by an external technology specialist contracted by the school. However, as she herself possessed the skills needed to create such a list, the specialist's checklist served to accentuate her technocentric view.

In contrast, Susan and Mary, whose preservice teacher education was limited to two years, demonstrated the most consistent inclusion of technology in their classroom learning activities. They were focused on their students and the way they used ICT responded to their students' needs. Both had a university degree in areas that supported aspects of the curriculum. Mary also had several years' work experience. Whilst neither had watched experienced teachers model the use of technology in teaching and learning, they were both able to transfer their skills and knowledge in ICT and pedagogy to the learning context.

THE FINDINGS

It has to be noted that a conspicuous disparity in their access to technology might have been one contributing factor to the difference in the participants' accounts, as illustrated in Table 5.3.

Table 5.3

Access to computers, Internet and data projector

Participant	No of classroom computers	Classroom Internet access	Access to data projector	School computer lab ^a
Arnold	1		✓	✓
Lucy	2			
Annabel	2			✓
Kay	1			✓
Pam	3 +pod	✓	✓	
John	2			
Susan	3	✓	✓	✓
Mary	2+3 in hub	✓	✓	✓

^aAll computer labs had access to the Internet

It is evident that if access is limited, it will be more difficult to make strategic use of technology. From Table 5.2, we can discern that Kay and Arnold's single classroom computer would offer limited incentive to contemplate using technology in the classroom programme. In stark contrast, Pam, Susan and Mary had much more generous access to ICT in their classrooms and adjoining facilities. Increased classroom access does not in itself bring about a greater focus on students and the learning process. However, the data indicated that, where available, the participants articulated a more learner-focused approach in their use of ICT. At the same time, it was also

THE FINDINGS

demonstrated that more ICT know-how did not, in itself, lead to better practice. This apparent paradox will be discussed in Chapter Six. Above all, these findings show the complexity in the meaningful use of ICT for beginning teachers.

School Culture and Mentoring

This section reports on the participants' experiences of induction and mentoring during their first year of teaching, generally, and as ICT-using teachers. The analysis of the participants' reported experiences are presented in Table 5.4.

Table 5.4

Participants' reported experiences of support and mentoring

Participant	School culture of support	Principal as curriculum leader	School culture of support in ICT	Tutor teacher support	Observed tutor teacher teach	Tutor teacher support in ICT	Access to professional development
John	✓	✓		✓	Another colleague		✓
Lucy	✓	✓		✓		✓	
Susan	✓	✓	✓	✓	Another colleague	✓	✓
Kay				✓		No/Yes ^a	
Arnold						✓	
Annabel	✓						
Mary	✓			✓			
Pam	✓	✓	✓	✓	"A wee bit"	✓	✓

^aChange of tutor teacher.

The identified topics that will be discussed in relation to teaching generally and ICT specifically are (a) school culture of support, (b) tutor teacher support, including

THE FINDINGS

satisfaction with the mandatory advice and guidance programme for provisionally registered teachers, and (c) access to appropriate professional development.

School culture of support

The majority of the participants expressed a sense of collegial support for professional and personal issues. This is illustrated by the following example: “I readily get help with issues I come across. That kind of goes generally for the whole staff, really, here” (Mary, Interview 2). However, school-wide support was not always as strong as this for a variety of reasons. Lucy, for example, explained that most of the teachers in her smaller, recently merged school were new. Only one teacher had worked in one of the pre-merger schools. Lucy explained that this contributed to a lack of cohesion among staff and they were working hard to combine the individual schools’ ‘ways’ into a unified merged school culture. At the time of the study, the present school culture was neither integrated, nor did a community of practice yet exist.

John, on the other hand, taught in a two-teacher school with limited options for support. However, he had developed a close personal and professional relationship with the principal. He felt safe to ask any question and had so far received support where needed. In a sense his school culture was integrated and he worked collaboratively with the principal. However, the principal’s leadership was hampered by the fact that he was new to the school and that a school learning plan had not yet been developed.

In contrast to Mary, Lucy and John’s experiences, Arnold explained that he had few colleagues he could turn to for assistance in his large school:

Oh, it’s quite hard, because it’s a whole new syndicate. There is one teacher out of five with experience in this school and two other teachers with experience, but not at this school. There is also one other beginning teacher. It’s not so much the planning—that’s great and we get a lot of support with that—but it’s more the other issues, the counselling issues for students, and the behaviour management aspect. Not with this class. It’s out in the playground. It’s just small things. I’m just getting worn down. (Interview 2)

THE FINDINGS

Arnold experienced a sense of isolation in a syndicate that appeared unaware of, or unable to support, his needs as a beginning teacher. This type of school culture can best be described as a comfortable culture or a novice-orientated culture as several teachers in the syndicate were new.

The principal's leadership role in maintaining a culture of collegial support was evident in a number of the participants' schools. This was so in larger schools such as those in which Kay, Annabel and Arnold taught. Here the principal appeared to be removed from the school's community of practice: support was delegated to syndicates and teachers with administrative roles. In contrast, staff in Lucy's school worked consciously towards developing an inclusive and collaborative school culture.

Factors identified by the participants which limited their sense of whole-school support were: lack of cohesion among staff because of the proportion of teachers new to the school or syndicate; new teachers' lack of institutional knowledge; a sense of isolation; the principal as school leader delegating responsibility; and the limited options for support in small rural schools with few staff.

School culture of support in ICT

In terms of a culture of support for technology, only two participants, Pam and Susan, reported this to be evident in their schools. These schools were generally known as having an ICT-rich learning environment. They were also schools where the principal appeared to be closely involved in the school's community of practice in all curriculum areas, not just in ICT. Pam explained the abundance of colleagues she could count on in regard to technology:

Everyone here knows how to use a computer and uses it within the classroom. And if there's trouble, everyone just asks everyone else. I can just ask for help for when I need it. Even in the middle of a class I'll go and ask the teacher next door a question. (Interview 1)

THE FINDINGS

The principal at Pam's school was at the forefront of encouraging collaborative ICT use. This was demonstrated in his daily news on the school's intranet and weekly quizzes, and the fact that he would answer emails from any student. He also demonstrated a relaxed form of leadership in another way, recounted by Pam in a question about how she got her third classroom computer: "It was a spare one in the school and the principal came and asked me, just passing through¹², 'Do you want another computer?' And I said, 'Yes, please!' And it turned up!" (Interview 1).

Another example of the principal's involved approach was that he could be called on to fix problems with classroom computers. A staffroom notice board was further evidence of a collaborative culture of support in ICT, as Pam explained:

We also have a whiteboard in the staffroom and if you want to book something, and if you write it there, then you have it. I have booked the laptops for the week after the computer lab finishes and I just write up on the whiteboard. That's the place to do it. (Interview 2)

It is evident from Pam's accounts that her school operated a community of practice where everyone was included. Furthermore, the principal showed curriculum leadership and fostered a collaborative school culture.

Similarly, Susan explained the way school-wide technology support began at her school at the very beginning of the year:

I was getting all of these bits of papers to start up everything, so . . . we had bits coming around saying, "What ICT do you want in your classroom this year?" and "Do you need anything?" 'Cause they were going through budgets and things like that. . . . I was a beginning teacher, and everything was just being fired at me. (Interview 1)

Susan's experience of being asked what she might need in technology was in stark contrast to feelings expressed by Kay. To a question about whether she had a printer in her classroom, she answered:

¹² Pam's classroom had a door at each end, acting as access points to adjoining classrooms.

THE FINDINGS

No-o-o. No, that's frustrating. Every time you want to print something out, you have to send the kids down to the ICT suite and then you are, like, "How long have you taken to do that?" you know. Yes, that's a pain. [I have not asked for a printer] but I should, but as a new first year teacher, you don't really go and put your hand up for everything. You sort of just be happy with what you have got. (Interview 1)

Kay's feelings about what resources she could expect to have indicate that she either had a strong sense of what were deemed appropriate resource requests in her school, or that she simply viewed her position as a beginning teacher as insignificant. Another possible explanation is that the school might have had a policy of not having individual classroom printers, which are usually more expensive to run. However, a lack of open dialogue resulted in resentment compounded by the fact that another teacher in Kay's syndicate had seven computers compared to her single classroom computer. She had thought about the fairness of that:

Why did they not split them up so that there was a couple in each? I thought about that, too. I don't know, because the girl next door to me doesn't have them either and she's not a BT [beginning teacher], so I don't think it has anything to do with being a beginning teacher. I think maybe it's because of the access to the plugs, because some of the classes already had, you know, what are they called? (Interview 1)

In a follow-up interview some months later, Kay had more to say about the issue of sharing the classroom computers:

I have thought about it. Next year I hope I might get more computers, if I am lucky, but I am going to ask if I can have half those computers but it's only because of the number of power points I have got – the outputs or inputs. . . . There's like a box for all the computer lines to go into and I don't have that in my classroom, so they just have to put another one in here. So that could be the reason why we don't have them. (Interview 2)

The impression Kay gave was of a school ICT culture where her participation remained peripheral and her needs and possible contributions were not considered. Kay appeared to have developed the courage to engage with colleagues about these matters although she had not fully understood the possible technical reasons for her single classroom computer.

THE FINDINGS

The general picture to emerge from these findings is that a culture of collegial support in ICT was not pervasive amongst the participants' schools except in the case of Pam and Susan. A principal's perceived lack of leadership in ICT in larger schools with computer suites might be due to a perception that ICT was 'taken care of' by the provision of a computer lab, which in some cases would include technical support. Another is where the principal's role is understood as that of an administrator rather than a curriculum leader. The latter point goes to the heart of schools being able to nurture a culture of support, which most readily develops from engagement by those with the power to initiate and make decisions. Alternatively, the principal might not have strengths or self-confidence in the use of technology.

Tutor teacher support

All beginning teachers, who are provisionally registered for the first two years of teaching, are required to participate in a jointly planned programme of professional learning. The mandatory 'Advice and Guidance Programme' is intended to be based on the needs of the individual beginning teacher. The tutor teacher is the key person in this process and is usually an experienced, senior teacher. Five participants talked positively about the general support they felt they received from their tutor teacher, illustrated by Susan as follows: "We have a meeting every week but if I have a problem before then, I can go and see her any time. I ring her at night and talk to her" (Interview 2).

Susan conveyed a sense of close relationship with her tutor teacher and she was the only participant to state that she could phone her at home. Perhaps this was more natural in a rural school such as Susan's.

Kay's first tutor teacher was a senior teacher. When this tutor teacher left in the middle of the year she was assigned a new tutor teacher. While she was pleased with her new tutor teacher, he worked in administration. As he had no classroom contact, this meant that modelling of teaching was more difficult.

THE FINDINGS

Annabel also had a tutor teacher with only administrative responsibilities—the assistant principal. At first Annabel accepted the difficulties she had making contact with her. She explained that her tutor teacher observed her in the classroom twice a term and gave her feedback. Later Annabel reported a change in the level of support she felt she was getting:

There was a big issue with my tutor teacher because I got no help for a while and then they told the principal. I still have the same tutor teacher—they just told her she had to give me more attention. (Interview 2)

Annabel did not explain who advocated for her. However, it was apparent that in spite of the intervention, her mentoring needs were not entirely satisfactorily resolved. Furthermore, an advice and guidance programme is required to comprise more than general support and observation with feedback, for example a jointly planned programme of professional learning (see p. 48). This was in evidence neither for Kay nor for Annabel.

Three participants experienced some negative issues with their tutor teacher for altogether different reasons. Arnold's issue was his tutor teacher's lack of institutional knowledge:

My tutor teacher is experienced and very good, but she's here three days a week part time, so not the full week. She's new to the school and she job shares. It would have been nice to have someone who had knowledge of the school. (Interview 2)

It does not appear that Arnold's tutor teacher was well chosen and there was no evidence of a planned programme of induction and professional development.

For John it was the fact of being in a two-teacher school with limited scope for support: "My tutor teacher is my principal and my tutor teacher and my colleague. That's the hard thing – just being the two of us" (Interview 1).

While the participants' advice and guidance programmes were not the main focus of this study, there is sufficient evidence to suggest that beginning teachers may

THE FINDINGS

not understand their entitlements to advice and guidance. As stated previously, this programme requires a jointly planned programme of professional development based on the beginning teacher's needs and has to be documented for later use in the application for full teacher registration. It is also possible that the power differential between the tutor teacher and the beginning teachers was such that they felt unable to articulate their concern. Furthermore, a number of the participants indicated that, in their opinion, the choice of tutor teachers was not always appropriate in terms of their availability, engagement at a classroom level, time available and having a jointly planned programme of teacher development.

Tutor teacher support in ICT

Approximately half of the participants reported that they had received a tutor teacher's support with ICT. The type of support varied greatly. For example, Arnold's tutor teacher's support was practical in nature. She was able to show him how to use unfamiliar applications. Arnold's needs in ICT were substantial and for his tutor teacher to take the opportunity to teach him new skills as needed might have been a good plan for him at that point. He turned down an opportunity to attend a two-day ICT conference, which might have opened his eyes to a pedagogical perspective and innovative ways technology is being used in many schools. The conference might also have acted as a catalyst for Arnold to move past applications to a focus on more meaningful technology use in curriculum content areas.

Kay gave a ringing endorsement of her new tutor teacher and his competence with technology:

He is just really clued up with ICT. He loves ICT, too. He tries to make me do everything on the computer. . . . He wants us to have electronic diaries going on and he wants all our planning done on the computer. Everything highlights and pops up at you and he's really pushing for us to be on the computer. But he also says that if it doesn't work for us, it doesn't work for us. He's very approachable. He is Harry Hard-Out in a nice way. I have got my own

THE FINDINGS

separate folder [on the network], where he puts everything I need, and he makes me resources. My previous tutor teacher was more of a mother figure for me, like, there was that real security. (Interview 2)

While Kay presents a rather technocentric view of her new tutor teacher, it is fair to say that he appeared to push her use of ICT by engaging her in new ways of using technology for administration and communication. In contrast, Susan explained that her tutor teacher was less experienced than she was herself and that this could be quite frustrating.

Mary and Annabel's cases were different. They described their tutor teachers as technology users, but stated that they had never talked to them about it. Mary, for example, suggested that because both she and her tutor teacher integrated technology into their programmes, they had not "sat down and planned together or talked about the planning of it together, probably because my skills or experiences in ICT are fine—I know what I am doing" (Interview 1).

The beginning teacher's weekly release time is an integral part of the advice and guidance programme. However, only two participants mentioned their release time. Mary said that she always got hers, but she did not elaborate on what she did during this time. Susan, on the other hand, said that not only did she always get her release time but also that her tutor teacher and she also planned what she did on each of these days.

As reported in Chapter Two, many commentators argue that beginning teachers can learn more about their own developing practice from observing more experienced teachers, for example their tutor teacher. This usually forms part of an advice and guidance programme. Pam and Susan said that, in a small way, they had been able to observe another teacher use ICT, which is illustrated by the following quotation: "I have had a wee bit of an opportunity to observe others, but not a lot. It was very useful—just watching the initial stages of explaining it to children, that's been good" (Pam, Interview 1).

THE FINDINGS

It was suggested to Mary at a beginning teacher course that she might like to observe other teachers. Subsequently, she did this at her school in various subject areas. However, she did not specifically observe an experienced technology-using teacher. Mary was the only participant to mention that she had attended a beginning teacher in-service course. These are usually hosted by the local School Support Services¹³.

As mentioned earlier, Annabel's tutor teacher was the deputy principal of the school with no classroom teaching responsibilities, which meant Annabel could not observe her. Neither did she have an opportunity to observe anyone else teach with or without technology which she regretted. She suggested that "maybe observing someone using the screen [interactive whiteboard] would be good" (Interview 1).

Fewer than half said their planned advice and guidance programme was being documented. Kay's new tutor teacher gave her an agenda each week about what they would cover, while Annabel noted that she only has the reports her tutor teacher wrote up. Susan explained that she planned her release days with her tutor teacher, but their meetings were informal and they did not document every meeting. In contrast, John appeared to have no planned mentoring programme because there were only two teachers in his school and their formal meetings were limited.

In summary, the positive finding to emerge about participants' support from their tutor teachers was that the majority considered their tutor teachers approachable and helpful. However, half the participants said their tutor teacher was either not very helpful in regard to support with technology or had never mentioned it. Furthermore, of the four who said they had observed an experienced teacher, in only two cases was their brief observation of an experienced ICT using teacher. The support mentioned was mostly of a practical nature: for example help with applications and technical issues.

¹³ School Support Services operate under contracts to the Ministry of Education and are funded to provide professional learning programmes and support for principals and teachers. Most offer beginning teacher in-service days.

THE FINDINGS

None of the participants mentioned a tutor teacher engage in professional dialogue, although these conversations may have taken place.

Access to professional development

The participants' access to professional development varied from being able to choose freely from a variety of professional development opportunities to having no access at all. Pam and John were the only participants to report that their professional development needs were likely to be met if they asked. Pam explained, "I have access to both staff development and in-time support. If I want to go on courses or if I want a set time for it, I can have it. If I'm having trouble with this, I can just go and ask" (Interview 1). Meanwhile, John revelled in the way his small two-teacher school provided many unexpected opportunities for him to engage in professional learning, as evidenced in the following quotation:

The principal's pretty good in that if I need to learn something, he'll organise that I go somewhere. I mean, I've only been here two weeks and I have already had one professional development day, and we are heading with another teacher from the Junior school round the corner for a day to observe another teacher's classroom and how her programme runs. And I've got a writing course in a few weeks and I think I have four things this term that I'm going to. Which is great, I mean, I'm straight out of college and I will have four days of professional development straight out—that's fantastic!
(Interview 1)

In stark contrast, Mary, Annabel and Kay had only limited opportunities to participate in professional development, but said they would like to do so. Mary, for example, missed being picked for a writing course she was interested in. Annabel had not asked for opportunities for professional development but said that if she did ask for something, "they would find it, because they are pretty helpful like that" (Interview 1). Meanwhile, Kay believed her school considered numeracy and literacy more important than technology:

THE FINDINGS

I would like to have the opportunity to pick professional development for ICT, but I think that, as a beginning teacher, it's not one of the important areas they want you to try to focus on. Like, maths is pushed, and English and literacy is pushed, but ICT—it's just presumed you are just good at it. So they don't think there's a real need for BTs [beginning teachers] to go on ICT courses. (Kay, Interview 1)

Kay's statement underscores the perception that ICT is separate from the curriculum, conceptualised as an add-on. Its affordances for learning in both literacy and numeracy were not considered. Her statement also demonstrates the assumption that beginning teachers, especially those believed to have grown up with technology, are invariably competent technology users and therefore competent ICT using teachers.

Summary

The findings on induction and mentoring showed that the majority of the participants experienced a general culture of support in their first year of teaching. However, this culture of collegial support was not always strong. Similarly, the majority reported satisfaction with the general support from their tutor teacher. There were, nevertheless, exceptions to the strength and focus of the support which frustrated the professional growth of some of the participants.

A school-wide culture of collegiality and support for technology were evident in only two schools. These were schools where the principal took the role of curriculum leader with emphasis not only on ICT but the curriculum as a whole. Meanwhile, about half of the participants reported tutor teacher support with technology. This support was often of a practical nature rather than opportunities to engage in professional conversations with more experienced colleagues. It also appeared that in many instances a programme of professional learning had not been planned jointly with the beginning teacher. The flow-on effect could result in the required documentation not being available when applying for full registration.

THE FINDINGS

Lastly, access to professional development was very limited. Only three participants said their individual needs were likely to be met whether by identifying needs and approaching their tutor teacher or as part of an advice and guidance programme planned with the tutor teacher. Surprisingly, only one participant mentioned having attended a beginning teacher in-service course.

Experiences that Contributed to Self-Perceptions of ICT Competence

Sources of the participants' perception of competence were analysed in relation to prior experiences, experiences during their preservice teacher education and experiences as practising beginning teachers. This raises the significance of self-efficacy in the development of a teacher. The concept of self-efficacy has been defined as "people's beliefs in their capabilities to produce desired effects by their actions" (Bandura, 1997, p. vii). This is clearly an area that needs further exploration in this study. The participants' reported self-efficacy belief in teaching generally, and teaching with technology specifically, are described below.

Prior experiences as a source of perceptions of competence in ICT

The participants' reported knowledge about and skills in ICT acquired prior to their preservice teacher education were gained through classes taken at secondary school, from their own efforts without formal instruction and from employment. This information is summarised in Table 5.5.

THE FINDINGS

Table 5.5

Prior experiences with ICT

Participants	Work experiences	Secondary School	Self-taught	No prior experience
John		✓	✓	
Lucy		✓		
Susan			✓	
Kay				✓
Arnold				✓
Annabel		✓		
Mary	✓			
Pam	✓			

Five participants reported that their prior experiences with technology greatly influenced their sense of competence with ICT. Mary and Pam cited work experiences as a strong influence. The Internet was in its infancy when Mary took her Bachelor of Arts degree and she described herself as ‘ICT phobic’ before getting a job. It was here that she learned to use ICT. Pam responded in a similar manner, “I worked in an office, so I sat at a computer for a year, so using a computer like that, you just get it ingrained exactly how to use it” (Interview 1).

Lucy and Annabel, on the other hand, took all the ICT-related classes offered at secondary school. Moreover, Lucy’s interest in technology went right back to her primary years:

THE FINDINGS

Probably primary school . . . I was one of the kids who did not have a computer at home, so I guess the chance to come to school and learn on that was always exciting and because of that I ended up taking TIM [Text and Information Management] in F3-7. (Interview 1)

Lucy and Annabel expressed a high level of self-efficacy belief evidenced by the way they talked, without hesitation, about their knowledge of, and competence with, ICT. Similarly, John identified compulsory computer classes at secondary school and his Internet-connected computer at home as the source of his initial perception of competence in ICT. His mother was someone he could ask about technology. He believed these experiences led to a sense of relative competence in his personal use of technology.

In contrast, Susan learned most about ICT while doing a Bachelor of Science degree before entering preservice teacher education. She credited her older brother with teaching her many things about computers, for example how to cut a CD. She taught herself how to manipulate photographs and found many ICT applications “pretty self-explanatory” (Interview 1). Susan articulated a high level of self-efficacy belief in technology.

Surprisingly for ‘Gen Ys,’¹⁴ Arnold and Kay reported that they had no experience with ICT prior to their preservice teacher education, although it was clear from their accounts that they had both used the Internet. However, they might not have associated this personal use of the Internet with the notion of having formal skills and knowledge about using technology in the classroom.

¹⁴ Gen Y, an abbreviation of the term, ‘Generation Y.’ It refers to young people born between the early 1980s and 2000, who are said to have grown up with technology, or, in the words of Tapscott (1996), have grown up as ‘digital natives.’

Sources of ICT self-efficacy beliefs in preservice teacher education

Reflecting on the extent of lecturers' and associate teachers' modelling of ICT use, the participants gave a range of responses in the background questionnaire. The responses are summarised in Table 5.6.

Table 5.6

Extent of ICT use modelled by lecturers and associate teachers

Participants	Lecturers' modelling	Associate teachers' modelling	Types of associate teachers' ICT use
John	Occasionally	Moderately often	Planning, reports
Lucy	Frequently	Frequently	Planning, assessment, reports, meeting notes
Susan	Never/Seldom	Never/Seldom	Did not see any evidence of teacher use
Kay	Occasionally	Frequently	Through literacy
Arnold	Frequently	Frequently	Main use planning. Also published work, library computer, digital camera
Annabel	Occasionally	Occasionally	Just for report writing
Mary	Moderately often	Occasionally	Computerised reports
Pam	Moderately often	Frequently	Report writing, publishing work, Internet research, children playing games/Internet research

As the participants were likely to have attended some of the same classes, it is surprising to note in Table 5.6 that their perceptions of lecturers' modelling range from 'frequent' to 'never or seldom.' It may suggest that to some, lecturers' technology use stood out as new or unfamiliar, while to others it might have been seen as ordinary and familiar. Lucy, who was very familiar with ICT, stated that her lecturers frequently modelled technology use. Conceivably, her response could be interpreted as an

THE FINDINGS

endorsement of what she saw. Modelling by lecturers and associate teachers as a source of self-efficacy was limited.

Questions in the same questionnaire about associate teachers' modelling of technology use during participants' practicums were in two parts: (a) ICT use for professional purposes, and (b) ICT use with students in the classroom. In answering, the participants did not clearly distinguish between these in their written responses. The level of ICT use given in Table 5.6, therefore, represents both types of use. Here Lucy and Pam responded 'frequently,' John 'moderately often,' Annabel and Mary 'occasionally' and Susan 'never or seldom.' Types of technology use described were literacy, publishing, children playing games, Internet research, library use, report writing, planning, assessment and meeting notes. The reported variation in frequency and the types of technology use suggested that the effectiveness of associate teachers' modelling as a source of self-efficacy beliefs was not high. The general lack of reference to curriculum, pedagogy and learning goals suggests that these vicarious experiences were unlikely to have greatly influenced the participants' personal efficacy beliefs in technology.

The background questionnaire also asked the participants to rate the extent of students' daily use of technology and the extent to which they had themselves incorporated technology in their own practice during the final practicum. These responses are reported in Table 5.7.

THE FINDINGS

Table 5.7

Classroom ICT use during participants' practicum

Participants	Extent of students' daily use of ICT	Extent of participants' ICT use with students	Whether encouraged by associate teacher to plan for ICT use
John	Occasionally	Occasionally	
Lucy	Moderately often	Frequently	✓
Susan	Moderately often	Occasionally	✓
Kay	Moderately often	Moderately often	✓
Arnold	Frequently	Moderately often	
Annabel	Moderately often	Moderately often	✓
Mary	Never/Seldom	Occasionally	✓
Pam	Frequently	Frequently	✓

Their response to the question about the extent of students' daily use of technology ranged from 'frequently' to 'never or seldom.' Examples of specific written comments were: "The computer use I saw on placement was mostly children playing games rather than curriculum integrated topic" (Lucy) and "On one placement the class had a roster that was used throughout the day. No matter what subject was being taught the children could go on the computer" (Susan). Children's reported use of technology described here lacked a context for learning and as such provided little guidance for the participants about effective classroom use of ICT.

Six participants indicated that they were encouraged to incorporate ICT in their planning while on their final practicum, when preservice teachers are in sole charge of a class. Their reported frequency of technology use in the classroom ranged from 'a little' to 'very often.' Comments about the usefulness of this experience were: "Very useful in

THE FINDINGS

that it gave you the opportunity to see the ICT capabilities of the children” (Lucy) and “She asked me to teach the children PowerPoint” (Annabel).

The findings show that the participants’ experiences were varied. For some including Lucy and Annabel, the experiences had a technocentric focus and rehearsed the familiar terrain of skills and the Microsoft suite of applications well known from their Text and Information Management (TIM) classes. Meanwhile Pam and Susan found ways to adapt their opportunities to use ICT meaningfully; for example: “We studied information technology in the form of letters. I set up pen-pals with students in Niue via email” (Susan). Specific ICT activities observed in the classroom are likely to influence preservice teachers’ beliefs about technology and therefore their own subsequent practice. For example, when I asked Arnold about the extent to which he had seen associate teachers use technology in the classroom, he replied, “The use for the children was limited to publishing because it was the young ones” (Interview 1). The message Arnold received was that a broad range of ICT uses is not appropriate or possible in junior classes. John conveyed a similar sentiment when asked a similar question:

Well, not really, particularly. I was in a New Entrant class, so there’s not a lot of opportunity to use it, but I guess it’s the same, you know, put the CD-ROM on and the staff is just not . . . it’s such a full-on position. . . . My associate said, “I’m not really computer literate at all, really.” (Interview 1)

John’s practicum experience did little to expand his understanding of the affordances of ICT in a junior context. However, when John subsequently became a junior teacher himself, he expressed strong self-efficacy beliefs about what he believed he could achieve with technology in his classroom programme.

In summary, while the data are limited, they nevertheless suggest that participants’ vicarious experiences of meaningful use of technology for teaching and learning were few and were unlikely to have been powerful sources of self-efficacy

THE FINDINGS

belief in ICT. Their performance accomplishments in ICT as a source of self-efficacy were severely limited by the conditions within the practicum experiences.

Finally, the background questionnaire asked participants to rate their level of technical skills and experience with technology, and their level of pedagogical skills and experiences with technology on completing their preservice teacher education. These responses are summarised in Table 5.8.

Table 5.8

Self-assessed ICT skills and experiences at graduation

Participants	Level of technical skills and experiences with ICT	Level of pedagogical skills and experiences with ICT
John	Fair	Moderately experienced
Lucy	Very experienced	Moderately experienced
Susan	Moderately experienced	Moderately experienced
Kay	Moderately experienced	Moderately/very experienced
Arnold	Fair	Fair
Annabel	Very experienced	Moderately experienced
Mary	Moderately experienced	Moderately experienced
Pam	Moderately experienced	Moderately experienced

As shown in Table 5.8, four of the participants rated themselves at the same level in both technical and pedagogical skills with ICT. Their perceived level of skills and experiences ranged from ‘very experienced’ to ‘fair.’ The other four rated their level of pedagogical skills and experiences with ICT either slightly higher or slightly lower.

In summary, the experiences with technology in the participants’ preservice teacher education were limited as sources for enhancing their self-efficacy with

THE FINDINGS

technology. Only two participants declared a sense of being ‘very experienced’ at a technical level, and the majority rated themselves at most as ‘moderately experienced’ at a pedagogical level. Kay was the exception. She rated herself ‘moderately/very experienced’ in spite of her declared inexperience with ICT. It also has to be noted that two participants rated their perception of competence as ‘fair,’ the lowest level of the questionnaire scale.

Self-efficacy beliefs as practising beginning teachers

Most participants embraced the opportunity to use technology once they began their careers as classroom teachers. During both interviews, Susan, Lucy and Mary expressed strong self-efficacy beliefs about using ICT with their classes. Susan, for example, said:

I feel pretty confident with computers and the help that’s available to me if I needed it. I am actually feeling quite excited about what I have got planned for the kids. (Interview 1)

Susan set herself challenging goals, which included the meaningful use of technology, and she maintained a strong commitment to these goals. She was motivated by her sense of self-efficacy and the expectation of succeeding if she worked hard. She described the demands of a large and stressful workload through the metaphor ‘feeling like I was learning to swim and had gumboots on.’ However, her strong resilience was indicated by another metaphor: “My chin is up and I am able to breathe now” (Interview 2).

In spite of Lucy’s self-efficacy beliefs, using technology was not a priority as she juggled her need to feel in control of her class and to achieve her instructional goals:

I was reasonably confident at the beginning of the year, I think, and I am still quite confident now. I don’t think my opinions have changed. It’s just trying to organise instruction into your planning—you need to have them written down so you can say, “Right. This is what we are going to do.” And then just do it. In the first term it was so busy that anything extra would just have made

THE FINDINGS

it diabolical. One thing I have noticed is that every time it looks as if it is settling down, something new pops up that you have got to make time for, and it just never ends. As I said, data projection would be great. It's just—it's time consuming setting it up and quite a few of my kids have poor vision, so I would have to organise it. I don't know—just a lot of organisation, just for particular things, where you actually can sit them down and they can look something up and then they can go. (Lucy, Interview 2)

Lucy's belief in being able to use ICT meaningfully in the teaching and learning process was frustrated by a teacher-centred approach to her students' use of the classroom computers combined with the demanding reality of first year teaching.

In contrast, Mary's self-efficacy belief in using ICT in the classroom was evident in the enthusiasm with which she spoke about it:

I love it. I'm excited. I would just rather have a lot more computers that I could access just like that [click of fingers] at all times. . . . I don't have huge amounts of knowledge, though, but I have kids in my class that do, so [laughed] I just ask them for advice. I still have enough of a level of knowledge to get by and not feel too stumped that I cannot work it out eventually or know where to go and ask. I also have two flatmates that are, you know, computer whizzes, so I'll just ask them at home if there's anything. . . . We're all nuts on it [laughs]. (Interview 1)

Mary's perception of competence was supported by her flatmates' knowledge of computers and knowledgeable students being able to help with ICT. Her self-efficacy beliefs were also evident in her determination to resolve problems as illustrated by the following experience:

I found this great website for procedural writing . . . a brilliant website, absolutely brilliant. And then the day I went to get it, it had vanished, it had been shut down, you know, "URL [uniform resource locator or "web address"] not found." I had a hard copy, so I just converted that into OHTs [overhead projector transparency] for another lesson, but it was disappointing. . . . I actually made it into a listening exercise. (Interview 2)

In this example, Mary demonstrated confidence with associated technologies. It was apparent that she relied not only on her technological knowledge in solving this particular problem, but also on her pedagogical insights in putting student learning at the centre of her concern.

THE FINDINGS

Annabel rated herself very experienced in ICT on graduation. She acknowledged that her self-efficacy beliefs with technology were shaken by the realisation that she was required to use an interactive whiteboard¹⁵ with her class every week in the school's computer lab. This new technology represented an unexpected hurdle to overcome: "It was the main barrier. I feel heaps better than last term, because I'm a bit more confident with the screen [interactive whiteboard]" (Annabel, Interview 1). Annabel had found that her technology skills and knowledge were not directly transferable to using the interactive whiteboard. She worked on regaining her sense of competence. In the second interview, she reasserted her perception of self-efficacy and resilience in coping with the realities of first-year teaching:

I have always felt I could manage. But maybe it is sometimes the amount of work we have to do that has made me feel I wasn't coping so well. . . . I feel now that I am able to deal with that amount of work. I don't go home and work all night anymore. . . . And now I feel that I'm actually really teaching the children instead of being like, "Oh god, what will I do now?" If I need any help, I just ask. (Annabel, Interview 2)

Particularly evident in Annabel's early career were the demands of balancing workload issues and life outside school. She asserted that she had learned to ask for help and not to let work completely dominate her life.

At first Pam also revealed strong self-efficacy belief in using technology in the classroom as the following comment shows: "I am quite confident with computers and the children in here are, too, and we get along just fine with it" (Interview 1). Later, Pam explained that she realised she had lacked knowledge about how to use computers in the classroom in the beginning in spite of having excellent general ICT skills and knowledge:

My confidence level in myself using ICT was quite high, but teaching it, because I hadn't taught much about it before, I was probably about here [pointing to a place one third along a continuum]. Now I am probably closer to

¹⁵ A large interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the whiteboard, where user can control the computer using a pen or finger.

THE FINDINGS

being here [pointing to a place two thirds along the continuum]. I mean, I still have a wee way to go. (Interview 2)

Being immersed in a highly effective school-wide ICT environment and recognising her initial struggle in using technology in the classroom, Pam drew on her strong self-efficacy beliefs and supportive colleagues in order to make progress.

Although John had assessed his level of technical skills and experience with ICT to be only 'fair' on graduation, he described feeling very confident with technology when he began his first year teaching: "Fairly up there. Not a whiz, but I know my way around the computer, I think. Obviously I have to do some work ahead" (Interview 1).

Being in a two-teacher school provided him with opportunity to take a leadership role in ICT, as he described in the following quotation:

Because there's only the two of us and I know the principal is not huge on ICT, I will be probably be taking the senior kids and he will take my eight. I would like to get them to make a website of their own as a class. We can take pictures of the work they have been doing and they can put . . . some of their writing and stuff like that and email the link to the parents and their grandparents and friends and so they can see what's happening in the class. The principal thought that was a good idea, so I guess I will be doing that. And the previous teacher who was here did the school website, so once I figure out how to do it I think I will do that job as well. (Interview 1)

John asserted a robust perception of competence in using technology in a variety of sophisticated ways. However, he revealed that he had reconsidered his ICT knowledge and skills in a later interview:

Probably [it is restricting] that I have never been properly taught. Everything I have done I have learnt myself on the computer. . . . but it would be nice to sometimes have learnt things properly as opposed to hit and miss. (Interview 2)

In spite of John's strong initial self-efficacy belief, the realities of putting into action his teaching intentions for ICT forced him to reflect on whether his preparation in technology during his preservice teacher education had been adequate. With hindsight,

THE FINDINGS

he observed that he would have preferred a more comprehensive grounding in technology and its use in pedagogical contexts.

Like John, Arnold also assessed his level of technical skills and experience with technology on graduation as ‘fair’. However, while he doubted his self-efficacy in ICT, he demonstrated anticipatory optimism that he would succeed in spite of the challenges. His motivation was sustained through the notion of ‘learning alongside the students’ and support from his tutor teacher:

Because I’m not the best, you know, not the most knowledgeable in this area, sometimes I’m a bit wary about teaching it, because I’m not too sure about it. But I’m starting to get better, because I know some of the children have a lot of knowledge in this area, so I get them to help me out and then help the other children. . . . It’s getting better. . . . Hopefully, I am developing my skills as we go, too, and I am learning from the kids as well [laughed], and also getting support from my tutor teacher, because she’s very able in technology. . . . But, yeah, in ways to teach it, I think I will become more confident, whereas this year I haven’t been one hundred percent sure what I was doing. (Interview 1)

Arnold was surprisingly frank about the challenges he was experiencing with ICT. He explained that he believed he had made some small progress in developing ICT skills: “I need to ask questions still and I’m not scared to ask because that helps in the long run. They are a lot better than they were, but they are still limited [laughed]” (Interview 2). He had a strong commitment to succeed but his ICT skills were weaker than indicated in his initial self-affirming beliefs. He depended on able students to help with his classroom use of technology, and on his tutor teacher to support him in gaining new skills in technology. Arguably, his lack of models and holding a technician view of the role of ICT in the classroom were limiting his progress.

In contrast, Kay rated herself ‘moderately experienced’ with technology on graduation. However, once she had commenced her first year of teaching, she began to doubt the ICT self-efficacy beliefs she had previously expressed. She achieved personal goals with ICT when away from the gaze of the students but viewed their judgement of her capability with technology as a threat:

THE FINDINGS

I'm OK with computers, but I wouldn't like to go and say, "I'll show you how to do this." I would like to be able to, but to be honest, I'm not that confident in front of the kids. . . . So when I go and do something on the computer, it takes me probably half an hour to do it, because I'm mucking around looking at all these other files, trying to find the right file. It doesn't flow nicely for me, so that's probably why I don't like doing it, because I don't want to be embarrassed in front of the kids. (Interview 1)

Kay believed technology had a role to play in her classroom programme but she was unsure how to link its use to the curriculum. Deterrents were her diminished self-efficacy belief in ICT, having only limited previous experiences with computers in the classroom and the fact of having only one computer in her classroom:

I know ICT has a role to play in a literacy and numeracy programme, but I'm not sure how to go about it. I know the teacher next door does all his maths on work sheets on the computer and they have, like, multi choice, because he has been teaching us how to do that. But then, he has the seven computers, so he can easily say, "That group go on the computer and do your work sheets." So, I mean, how are we supposed to do that, when we don't have them? (Interview 1)

Watching her colleague use ICT in mathematics served as a model for Kay. However, it is debatable whether the particular model of technology use was a useful example for her. The use of electronic worksheets may have lacked a pedagogical purpose, and if the teacher had to create the work sheets, this would have presented a complex and time-consuming task. While this modelling stimulated Kay to think about ways to use ICT, it would, in reality, have been more likely to erode her self-efficacy beliefs than strengthen them.

In the second interview, Kay expanded on her particular challenges with ICT and discussed her personal perspective on technology:

Earlier in the year ICT was more of an interest simply because it can make your life a lot easier. But it's also confusing, because sometimes you just don't have an understanding of the program or how to do something on the computer. Like, technology is just going sky high, there is always something new going on and it's really hard to keep up. I think we need more PD for it, but then sometimes it's boring to sit in front of a computer. (Interview 2)

THE FINDINGS

Kay's comments indicated that she was aware of solutions to increase her capability with technology by acknowledging her need for professional development. However, she also revealed a view of technology use as tedious, suggesting that the decline in her self-efficacy beliefs in ICT was continuing.

To summarise, each participant had their own story about their perception of competence in ICT as practising beginning teachers. Susan, Mary and to some degree Pam had high self-efficacy beliefs, took on challenges, showed a commitment to succeed and were able to transfer their technology skills and knowledge to the classroom learning process. Lucy and Annabel, who also had high self-efficacy beliefs in ICT, found it difficult to transfer their skills, and their sense of competence decreased in the face of unanticipated circumstances. Meanwhile, John, Arnold and Kay were forced to reassess their self-efficacy beliefs in ICT when they found their actual competence did not match their perception of competence.

Perceived self-efficacy in general ability to teach and to use ICT

The participants were asked about their perception of competence in their general ability to teach and in their ability to use ICT in the classroom. As would be expected, they typically reported a perception of increased competence in their general ability to teach since the beginning of the year. However, when John, Kay and Arnold were asked about the level of their perception of competence in the second interview, they notably ranked themselves much higher in general ability to teach than in their ability to use technology in teaching and learning.

In contrast, Lucy, Mary and Annabel reported virtually the same level of increase in their perception of competence in both their ability to teach and in their ability to use ICT in the classroom. We can conclude that for some of the participants, their self-efficacy beliefs in ability to teach generally and to use technology continued

THE FINDINGS

to grow steadily growing in tandem. For others, perceived self-efficacy in teaching was increasing at a higher rate than their perceived self-efficacy in using ICT in teaching.

Summary

This section analysed the participants' perception of competence in ICT based on prior experiences, experiences during their preservice teacher education and experiences as beginning teachers. The findings showed that participants with prior experience with computers generally demonstrated high self-efficacy belief in ICT, and those with technology skills developed at secondary school exhibited the highest self-efficacy belief.

The participants had limited opportunities during their preservice teacher education to increase their self-efficacy in ICT through appropriate experiences. Access to enactive mastery experiences on their practicums was minimal. Vicarious experiences in the form of modelling by lecturers and associate teachers varied in their effectiveness as sources of efficacy.

As practising beginning teachers, three participants benefited from a high level of self-efficacy, enabling them to transfer their ICT skills and knowledge to new situations. Two participants, also with high self-efficacy belief in computer applications, found these were of little help in the teaching situations in which they found themselves. The remaining group of three participants initially expressed a perception of competence in ICT but the reality of classroom revealed that their actual competence did not correspond to their prior perception.

Finally, the findings showed that some participants' self-efficacy beliefs about teaching and about using technology both increased, while for others the growth in perception of competence in general ability to teach grew more rapidly than the perception of ability to use ICT.

Reflection on ICT in Preservice Teacher Education

The participants reported on a number of issues and experiences in relation to technology in their teacher education. They ranged from ‘slipping through’ the ICT competence test to reflecting on technology courses in their teacher preparation, and from experiences with technology on their practicums to considering what they wished they had learned more about in their preservice teacher education.

‘Slipping through the net’

On entry into their preservice teacher education, the participants had to take a practical computer test that would assess their competence in using a computer (see Appendix S). Those who did not meet a minimum competence standard on the test, would have to do a short catch-up course to improve their basic competence in ICT. Arnold did take the test and failed it but was not required to do the catch-up course; he simply ‘slipped through the net’:

I should have been made to do the course. Because it was a test, like a mastery test, and if you couldn’t do certain things, then you would be made to do the course. . . . That would have catered for a lot of those needs [I have now].
(Interview 1)

Because of his attitude to technology at the time, it is likely that Arnold would have been happy to miss the computer mastery test altogether. A further observation was the fact that at this point he was unaware of the importance of ICT in schools and how much he was going to need or want to use it as a classroom teacher. While the computer catch-up course might have provided Arnold with only basic skills, these might nevertheless have made a small difference to his self-efficacy belief. On the other hand, his ‘anti’ stance towards technology might have negated any gains.

In contrast, John was surprised that he did not fail the test and wished he had been made to do the catch-up course:

THE FINDINGS

I didn't feel I had done as well as I probably should have, but I was never made to do the computer course and some of the stuff I think I should have done. I don't think that was right—I don't know if I slipped through the cracks or what. (John, Interview 1)

Looking back, John came to see the computer mastery test as an opportunity that offered further tuition if his skills were found wanting. He demonstrated an understanding early in his career that he needed more comprehensive skills and knowledge in ICT than those the test revealed him to have. It is also questionable whether the test itself was able to assess the technology skills and knowledge needed as a foundation for preservice teacher education. Unfortunately, John also missed the only other opportunity he had to learn about technology in his preservice teacher education:

You did a technology course for the first semester in your first year. We had two days on ICT and I missed one because of sickness, and the second day the lecturer failed to turn up until we went and asked where she was. She came to the lab and that was almost at the end of that period. So we had a four-hour session and what was happening the second day was the completion of something from the first day, so I didn't really get any ICT experience. (Interview 1)

As the compulsory components in ICT in the participants' preservice teacher education were surprisingly few, John was unfortunate in missing the opportunity to learn more. On the other hand, it is debatable whether he would have felt more prepared even if he had participated in the short computer catch-up course and technology module.

Reflection on ICT courses in their preservice teacher education

Several courses in ICT were available to those participants who were in the three-year programme in primary teaching. Neither John nor Arnold took any of them. However, in hindsight they both believed technology should play a larger part in preservice teacher education. John reiterated the belief that he was not given sufficient opportunity to learn about ICT:

THE FINDINGS

I think there was probably not enough training put into it at my preservice institution, especially as we are supposedly the ICT generation, and with the kids that are coming up now, I think it probably should be taught. Probably not as much as English, but I think it should be a bigger component than—more than two days. (Interview 1)

John's concern was not feeling well prepared in technology considering he was a 'Gen Y' and students he was now teaching were growing up with technology. In particular, he expressed surprise that such issues had not filtered into teacher education and resulting in more emphasis on ICT.

Based on his own lack of experience with technology, Arnold went further with specific suggestions for extending learning opportunities with ICT in teacher education:

As I slipped through that computer course, I think possibly having ICT almost as a curriculum area, like a component of preservice teacher education, like how you have human development and all that for a semester. I think that should be compulsory for everyone in computer skills. For those who already have the skills, still have the initial test, but have a higher cut off point, like a 90% pass rate, so if you get 90% in this test, that's fine. There may only be 10 very able students go through, while the rest still have to do a course. I know that's, sort of, what is in place at the moment but that only went for—I don't even know how long they went for! [Laughed] But it cannot have been that long. . . . I think if there was a course that showed everyone the different programs, when to use it and why and how and all that in different ICT areas. . . . And they also need like a unit standard for a NZQA sort of system like the other courses have, like say you get 6 credits for English, make something for ICT, so it's a major component you have to get to pass the course. It would have helped me a lot for this year, because I would have known this stuff. I would have known more. (Interview 2)

It was notable that Arnold had moved significantly in his orientation towards technology—from one of initial reluctance to his present advocacy for its integration into teacher education. It was also significant that he thought about to how ICT knowledge and skills could be fostered in practical terms. However, his suggestions did not indicate an awareness of a pedagogical dimension to technology use in teaching and learning contexts.

THE FINDINGS

Annabel realised that her knowledge was not always appropriate for using technology in her classroom programme in spite of being a competent ICT user and having taken technology courses during her preservice teacher education:

I learnt most of what I knew at secondary school, and my kids are too young to learn things like PowerPoint and how to make a movie, and that's what I learnt during my preservice education. (Interview 2)

Annabel recognised the mismatch between her skills and knowledge in ICT and the needs of the age group she was teaching. However, her preservice teacher education did not appear to have demonstrated the possible affordances of ICT with diverse age groups. Notably, as was the case with Arnold, a deeper pedagogical dimension was also missing in Annabel's account.

Practicum experiences with ICT

Typically, the practicum is one area of preservice teacher education where preservice teachers are expected to have opportunities to observe an experienced teacher use ICT meaningfully in teaching and learning contexts. However, as Pam and Annabel pointed out, this was not always so:

But it doesn't always happen. Not all associate teachers use that sort of thing or have access to it—you would hope so, but I know of enough cases where it hasn't happened, where people haven't had the contact with computers in the classroom. (Pam, Interview 2)

Annabel's story was slightly different. She said, "Also more experience of this in the classroom on practicum, because my teacher just relied on me to do all the ICT, so I only taught what I knew" (Annabel, Interview 2). Being counted on 'to do all the ICT' meant she had an opportunity to apply what she knew and gain some experience. Nevertheless, she did not have the opportunity to see, learn from and be guided by an experienced teacher in how to use technology in the classroom.

THE FINDINGS

It was during the practicum that these beginning teachers had anticipated learning about what computer programs schools use and what was available for particular class levels and curriculum topics. Above all, they hoped to see their experienced associate teachers demonstrate what meaningful use of ICT looked like in the reality of the classroom.

What participants wish they had learned more about

In describing areas they wish they had learned more about, all participants identified a wide variety of perceived needs from “just getting to know the different aspects of the computer, like word art and clip art . . . that can enhance teaching and displays and things around the classroom” (John, Interview 1) to “bits like cutting up files and music . . . if the file is too big, how do we cut it in half and save each half of it at a time to the disk” (Susan, Interview 1). The ‘wish list’ overwhelmingly focused on functional aspects of technology use; for instance, how to use applications such as PowerPoint, how to use a scanner, how to use a digital camera, what software was available for their particular class levels, how to make movies, about suitable interactive CD-ROM titles, how to make web pages, and learning about multimedia.

Pam, who was experienced in business-type computer applications, similarly realised early in her career that she was unsure how to use technology in her classroom.

This is illustrated in the following quotation:

I think actually how to use it in the classroom. How to, the whole—“OK, I have two computers and I have 28 children, how do I use that in the classroom?” Specific examples, not, “You can use it for this and this and this”, but an actual lesson, to watch an actual lesson of how it is used. I would have found that useful. . . . You incorporate it in your planning, but how do you teach it with the children? It’s just the teaching side of it I wish we had learnt about. To watch an actual teacher in action, probably, would have been the best way to do it. (Interview 1)

THE FINDINGS

Pam realised she lacked the pedagogical ICT knowledge and understanding she felt were needed to use technology in her classroom in a manner consistent with her student-centred teaching philosophy. She expanded on what beginning teachers need:

Look, I have just stumbled my way along and talked to other teachers to find out how I can use them in the classroom. More instruction on how you can use it in the classroom instead of showing us how to use Word documents and that sort of thing. Show us how we can use it in the classroom rather than how to use it ourselves. That would have been beneficial. (Interview 2)

Pam supported the line of reasoning that knowledge of computer applications alone is not sufficient to capitalise on the affordances of ICT for student learning. She stressed that a pedagogical dimension should be an integral part of learning about using technology in the classroom, and how that was missing from her preservice teacher education.

While Kay lacked knowledge, skills and experience with technology, she nevertheless concurred with Pam that she found it difficult to know how to use ICT in the classroom:

Most of all, I wished they had learnt how to integrate ICT more effectively in the class programme. . . . Schools presume we know the stuff, because you are young, you have just come fresh out of preservice education, and you should know all these things about ICT. (Kay, Interview 1)

Kay was the only participant to note that schools expect their beginning teachers to be well prepared in ICT.

In regard to using a school computer lab, Pam was the only participant to specifically note a difference between the context of teaching with ICT in a classroom and teaching in a computer lab. She explained:

It would have been useful to experience teaching in a computer lab, which is quite a different thing to a classroom. Having a whole computer lab—some different strategies on how to teach with everyone at different levels and that sort of thing, because I find going to the computer lab—it's not so bad now, but when I first went there I thought, "What am I doing here?", because it was quite an overwhelming experience. It's a lot better now, because I know the children, but it was quite scary the first time. (Pam, Interview 2)

THE FINDINGS

Like Annabel, Pam recognised that a pedagogical dimension was missing from her experience with technology in the setting of a computer lab.

Meanwhile, Annabel expressed regret that with her passion and interest in ICT, she missed the opportunity to graduate well prepared for the challenges she had faced when using technology in her classroom.

Summary

The participants' reflections on ICT in their preservice teacher education were influenced by their individual backgrounds, orientation to technology, chosen course options and experiences in their practicums. Two participants felt they had 'slipped through the net' when assessed for ICT competence and missed out on learning more about technology. A surprising finding was that a number said they did not realise how much they were going to need ICT as beginning teachers. For some of the participants, a lack of basic competence in ICT was a concern as they struggled to meet their schools' expectations and their own needs as classroom teachers.

Few participants reported seeing their associate teacher use ICT meaningfully in teaching and learning and the majority were not encouraged to incorporate technology into their planning. Another comment made by the participants was their lack of knowledge about what software was generally used in schools and what was available for various class levels.

In hindsight, most would have liked to learn more about technology during their preservice teacher education. Most of all, they wished they had graduated competent in the meaningful use of ICT in their classroom practice.

Chapter Summary

This chapter presented the findings from a study of eight beginning teachers' experiences with ICT in their first year of teaching. Seven key themes emerged from the

THE FINDINGS

data analysis and they were used to organise the findings. They revealed that a range of factors impacted on the participants' experiences with technology as they sought to use it in their classroom programmes.

First, the participants' revealed limited knowledge of ICT policy both at the national and the school level. No participant reported having seen the national ICT policy document or their school's technology policy, indicating a serious gap in their knowledge.

Second, the participants' used a mix of rationales to express their views on the role they perceived ICT to have in schools. Most commonly cited were future and social rationales based on the ubiquity of technology. The vocational rationale was a second justification given. Only three participants made a close connection between ICT and learning opportunities with technology. Overall, technological and social deterministic views dominated, linked to participants' lack of knowledge of policy. Any sense of critique was therefore absent.

Third, their lack of awareness of policy influenced their beliefs about schools' expectations of their use of technology. Although half of the participants were aware of the general role ICT was expected to play in their classroom programmes frequency of use in their teaching and learning programmes was a predominant perception. In a number of cases the participants' ICT focus had a technocentric orientation, which limited the effect of the affordances of technology on student learning.

Fourth, concepts about ICT in classroom practice were analysed by means of a model of teacher thinking in four dimensions of practice. The analysis concluded that some participants found it difficult to focus their ICT practice on learners and the learning process. Disparity in access to technology was a notable difference that influenced some participants' opportunities to consider using technology.

THE FINDINGS

Fifth, most of the participants experienced a culture of support in their schools. However, this support varied and was not always inclusive. Six participants felt they had supportive tutor teachers but a planned programme of advice and guidance was not always apparent. Access to appropriate professional development in ICT was limited. The principal as the professional leader of the school was found to be the key to a collegial and inclusive school culture. Where school culture was strong, the participants were satisfied with their tutor teacher and collegial support. Half the participants reported a school-wide culture of support, but only two described their schools as having a culture of support in ICT.

Sixth, the participants' self-efficacy beliefs were considered. It was found that those with prior learning had higher self-efficacy beliefs in ICT. Opportunities to develop self-efficacy beliefs during the participants' preservice teacher education were limited. Enactive mastery experiences on practicum were infrequent, and observing lecturers and associate teachers model technology use was ineffective as a source of vicarious experience. The analysis showed the domain specificity of self-efficacy: transfer of skills from knowing how to use computer applications to using this knowledge in a pedagogically meaningful way in the classroom was difficult. Those with prior knowledge from the work place and who were self-taught more easily adapted their knowledge to the classroom situation, where their successful technology use served to increase their self-efficacy belief.

Last, the participants' reflections on ICT in their preservice teacher education were presented. All wished they had learnt more about technology. A striking finding was that a number of the participants were unaware as preservice teachers how much they were going to need technology as teachers, which links to their beliefs about their schools' expectations of them and their views of the role of ICT in schools. Foremost in

their reflections were that they wished they had seen an experienced teacher use technology in a real classroom.

Overview of the Findings

The themes in this chapter build on the biographical portraits presented in Chapter Four. At the end of the previous chapter, it was concluded that the participants had diverse prior experiences with technology and that a small number had taken courses in ICT during their preservice teacher preparation. Few said they had observed an experienced teacher use ICT for teaching and learning or used technology themselves with students while on practicum.

Together, both chapters have presented evidence of beginning teachers' use of ICT for teaching and learning that may be characterised as follows:

Beginning teachers have diverse prior knowledge of and experience with technology. In this study, having grown up in an age of rapid technological growth was shown to have limited impact on the majority of the participants' ability to use ICT meaningfully for teaching and learning. This study revealed the beginning teachers' lack of knowledge about the purpose for using technology in schools as expressed in policy at a national and school level. Meanwhile, a mix of future, social and vocational rationales underpinned their views on the role of technology use in schools.

The analysis of the beginning teachers' concepts about ICT in classroom practice concluded that some found it difficult to focus on the learner and learning process when using technology. For a number of the participants classroom practice with ICT was characterised as technocentric which limited the potential benefits of the affordances of ICT on student learning.

The principal was found to be of key importance to a collegial and inclusive school culture which benefited beginning teacher development most. Six participants

THE FINDINGS

felt they had supportive tutor teachers but a planned programme of advice and guidance was not always apparent. The study found that opportunities to build self-efficacy beliefs in ICT during the participants' preservice teacher education were limited. On reflection, they all wished they had learnt more about technology, above all having seen an experienced teacher use technology in a real classroom.

In Chapter Six, I discuss the key themes in relation to the research questions (listed in Chapter Three, p. 66) and with reference to the relevant literature (Chapter Two). To do so, I have collapsed the seven salient themes that emerged from the data analysis into five meta-themes for discussion. This decision was based on my intention to integrate and fully present to the reader the nuances of the participants' conceptions, beliefs and views in the Findings. For the discussion, I considered it more appropriate to present these issues in a holistic and succinct manner under a handful of meta-themes that build on both the literature and the research questions. None of the data were omitted. The five meta-themes discussed follow through into the five key findings that are discussed in the Implications' chapter.

CHAPTER SIX

DISCUSSION

This chapter discusses the findings of a study of eight beginning teachers' experiences with ICT in their first year of teaching. The chapter comprises five subsections. It begins by reflecting on the participants' knowledge of ICT policies for schools and then discusses their understanding of ICT's role in teaching and learning. Next, the impact of conditions in the work environment on beginning teachers' development is examined with school culture and mentoring as the focus. The chapter then moves to discussing factors that influence beginning teachers' self-efficacy beliefs about technology. Lastly, a number of lessons for preservice teacher education in ICT are proposed based on the participants' reflections on their preservice preparation in technology.

Teaching is a complex and delicate act. It demands that teachers analyze the situation, consider the variables of students, text, knowledge, ability, and goals to formulate an approach to teaching, and then to carry it out—every day, minute to minute, within the ever-shifting context of the classroom.

(Danielewicz, 2001, p. 9)

Introduction

This chapter discusses the key themes of this study in relation to the research questions (Chapter Three) and with reference to the relevant literature (Chapter Two). To do so, I have collapsed the seven salient themes that emerged from the data analysis into five meta-themes for discussion. My intention was to integrate and fully present to the reader the nuances of the participants' conceptions, beliefs and views in the Findings. For the discussion, I deemed it more appropriate to present these issues in a holistic and succinct manner under a small number of meta-themes that build on both the literature and the research questions. None of the data were omitted. These five

DISCUSSION

meta-themes follow through into the five key findings that are discussed in the Implications' chapter.

The participants were eight beginning teachers in their first year of teaching, who were graduates from the same preservice teacher education institution, and employed in schools dispersed throughout New Zealand in both urban and rural settings. As indicated in the methodology chapter, the potential limitations imposed by the participants being from a single preservice teacher education institution are that one cannot generalise the findings to all beginning teachers and preservice institutions.

A social interpretivist perspective underpinned the methodology and qualitative methods were used to gather and analyse the data. Biographical portraits of each of the participants and their experiences of ICT were presented in Chapter Four. The findings of the data analysis as a whole were presented in the previous chapter, Chapter Five. They were organised under seven themes that emerged from the data analysis. The quote which introduces this chapter illustrates the underlying theme of the findings of this thesis: that teaching and learning to teach, with and without using ICT in the classroom, is complex.

This chapter discusses the findings under five meta-themes within the context of the literature reviewed in Chapter Two. They are: (a) knowledge of ICT policies for schools; (b) understanding ICT's role in teaching and learning; (c) impact of conditions in the work environment; (d) factors that influence beginning teachers' ICT self-efficacy beliefs; and (e) lessons for preservice teacher preparation in ICT.

Knowledge of ICT Policies for Schools

National ICT policies for schools spring from the broader political landscape. This subsection argues that teachers need therefore to have knowledge of the policy process in order to be able to problematise their work and link it to the wider context in

DISCUSSION

which they operationalise the curriculum. The stance taken is that teaching has a moral and democratic purpose.

Historically, the market reforms introduced by the Fourth Labour Government in the 1980s have been credited with shaping the education policy landscape of today (Coxon, Jenkins, Marshall, & Massey, 1994; Olssen & Matthews, 1997). These reforms concerned issues such as globalisation, the knowledge economy, and enhancing New Zealand's competitiveness by having a flexible and skilled work force (Coxon et al., 1994; Olssen & Matthews, 1997). The ideology of these reforms underpinned New Zealand's first ICT policy for schools (Selwyn, 2008a). For example, it called for students "to succeed in a modern competitive economy" and for their education "to meet the technological challenges of the future" (Ministry of Education, 1998, p. 5). According to Selwyn (2008b) this rhetoric remains unchanged in recent iterations of ICT policy for schools.

The participants in this study demonstrated no awareness of ICT policies at a national level. They were therefore unable to articulate any position on existing policies. As a consequence, they lacked the ability to link the 'bigger picture' of a national education policy with the policy practices within their schools (Vidovich, 2007). This revealed an important gap in their knowledge of the drivers of, and ability to critically read, the dominant discourse on ICT in education.

The first year teachers in this study strongly perceived technology use as unproblematic and its presence in schools was accepted uncritically. This was illustrated by the metaphors they used to describe the role of ICT in education, for example, that it was 'the way the world is going.' The way teachers understand the purpose of ICT in schools has been found to influence how they use technology (Drenoyianni & Selwood, 1998). It is therefore of major importance that teachers are informed about such policies and understand them in ideological terms (Selwyn, 2008b). Teachers need to subject

DISCUSSION

policies to critical analysis by asking questions such as ‘Whose interests are being served?’ and ‘What is the purpose of education?’ (Coxon et al., 1994). To do so, they require strategic knowledge (Kemmis & Carr, 1993). In this context, strategic knowledge refers to a broad understanding of the historical, social, and political context of education.

Compared with a study on the sense of preparedness of preservice teachers at point of graduation (Elliot, 2002), the participants in the present study had no notion that their work had a political dimension, nor did they indicate that they saw themselves as ‘public intellectuals’ (Aronowitz & Giroux, 1993; Cochran-Smith, 2006). Cochran-Smith explains the notion of teacher as public intellectual as follows:

In whatever realm one has influence and access, one is obliged to offer critique of policies and practices that are problematic in terms of logic or evidence or that will not serve the best interest of schoolchildren, families and teachers. (Cochran-Smith, 2006, p. 203)

This view places the responsibility on teacher education to empower prospective teachers to understand schooling as embedded within social, political and economic structures.

Although the participants were unaware of national ICT policies for schools and therefore held no position on them, these new teachers did not act in a vacuum when using technology to enact the curriculum. This was demonstrated in their rationales for ICT, which are discussed in the following section concerning the role of technology in schools.

Understanding of ICT’s Role in Teaching and Learning

This section firstly discusses the participants’ perceptions about the role of ICT in schools. Secondly, it considers their understandings of the role of technology in the teaching and learning process. Beginning teachers’ perceptions and understandings

about ICT are important because they inevitably influence their pedagogical decisions in the classroom.

Perceptions about the role of ICT in schools

Four rationales have been put forward by Hawkrige (1990) for the perceived role of ICT in schools: the social, vocational, pedagogical and catalytic rationale. These rationales were used earlier in this thesis to frame the participants' responses to a question about the role of technology in schools (see p. 120). In their emergent practice with ICT, most participants expressed a mix of these rationales to explain the role they perceived technology to have in schools.

From the perspective of a social rationale, there are good reasons for students to learn how to participate in contemporary social and cultural practices (Hipkins, 2005; Lemke, 2002), for example using ICT to express themselves. However, the vocational rationale is problematic. In sociological terms, Bourdieu's notion of 'habitus' (Bourdieu, 1977; Bourdieu & Passeron, 1990) suggests that the structures of schooling are complicit in reproducing existing inequalities. It could be argued, therefore, that learning to use ICT is unlikely to change the future vocational circumstances of the majority of students or, as Nash (1984) and others (Willis, 1977) remind us, 'schools can't make jobs.'

The prevalence of future-oriented and vocational rationales put forward by the participants in this small study, combined with a lack of knowledge about the anticipated role of ICT in their schools, could be seen as an inadequate basis from which to implement the meaningful use of ICT in their classroom programme, and this was borne out by their reported experiences. This is not surprising given the absence of clearly stated principles for ICT use at both the school and the national level that they had no clear sense of why they wanted to use this technology or to what end purpose.

The role of ICT in the teaching and learning process

As we saw in Chapter Five, the participants predominantly viewed ICT as a utilitarian tool. This unproblematic conceptualisation of technology was considered in Chapter Two. There it was argued that when the computer is seen as ‘just a tool’, it is viewed as a “neutral means to an educational end” that “can be moulded and used for various purposes” (Selwyn, 1999, p. 94). From that perspective, ICT tools are simply part of the teacher’s toolbox and can be brought out as needed (Brown & Murray, 2005). This represents a technocentric view of ICT, where the focus is on the technology. Brown and Murray assert—albeit with no empirical evidence—that teachers with this view are numerically the largest amongst teachers.

The participants’ mainly technocentric conceptualisation of ICT’s role in schools was reinforced by their schools’ expectations as reported by the majority of the participants. Their foremost understanding was that ICT should be used as frequently as possible. The focus was reportedly on presentation skills without a particular pedagogical purpose, for example to challenge students’ thinking and promote learning (Webb & Cox, 2004).

At the school level, a curriculum delivery plan and specific technology policies usually outline each school’s aims for ICT and how these are to be achieved. Yet, most participants did not know, or were unsure, if their school had a policy or plan for technology. This suggests they had insufficient briefing of school policies as well as lacking in pedagogical and curriculum content knowledge. It also indicates that the majority of the participants’ schools apparently had not articulated to their beginning teachers the pedagogical reason for ICT use in their schools’ learning programmes. It is possible that this information was provided but had little relevance at the time or that the schools themselves did not have a well-articulated position on the purpose for ICT use. If the latter case holds true this left the beginning teachers in a ‘no-win’ situation

DISCUSSION

and could limit their development as teachers. After all, teachers need to understand the crucial link between subject knowledge and the affordances of ICT to use technology meaningfully as stressed by Webb and Cox (2004).

A paradox manifested itself in two participant subgroups' conceptualisation of the role of ICT. One group had taken Text and Information Management (TIM) at secondary school, while the other had prior work experience. Those participants who had taken TIM and were highly efficient in the Microsoft suite of applications focused on their students developing skills in these applications as illustrated by Lucy: "At the moment we are doing narratives, so these guys are publishing their stories on the computer, just pretty much to learn Word and basic properties of Word" (Lucy, Interview 2).

The self-taught group with prior work experience presented a different understanding of the role of ICT and demonstrated an ability to transfer their technology skills to a pedagogical situation. For example, Pam said, "At the moment they are publishing their written stories. Next time when we move into using the computer they will type straight onto it" (Interview 1). It should be noted that very few, if any, of the teachers of the Y1 to Y6 students encouraged word-processing without a prepared and corrected script. In this regard Pam's intention stood out.

Albeit speculative, these observations suggest that those with prior application-based ICT skills were restrained in their conceptualisation of ICT by the specificity of their knowledge. Arguably, this 'straightjacket' hindered their ability to transfer their knowledge and skills to the pedagogical context of teaching and learning in the classroom. In contrast, those with prior work experience and who were self-taught were better able to link their ICT knowledge and skills to the curriculum and the affordances of ICT. In other words, prior knowledge and experience may impact on the way beginning teachers conceptualise the role of ICT in the learning environment.

DISCUSSION

The complexity of teacher knowledge needed for meaningful use of ICT should not be underestimated. This has been demonstrated in a new framework of technological pedagogical content knowledge (which was briefly mentioned in the literature review [p. 13] and has been further developed since the fieldwork for this research was carried out). The framework is based on Shulman's (1986) classification of teacher knowledge. Shulman proposed that teachers not only need content knowledge and knowledge of pedagogy but also pedagogical content knowledge (PCK). Mishra and Koehler (2006) argue that knowledge of technology is often viewed as separate from knowledge of content and pedagogy, with ICT use focusing on the technology itself. They expanded Shulman's PCK concept by adding the integrated notion of technological pedagogical content knowledge (TPCK) and stressed that "thoughtful, pedagogical uses of technology require the development of a complex, situated form of knowledge" (p. 1017). TPCK, they argued, "emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology" (p. 1025) and represented a much expanded vision of the forms of knowledge teachers need to use ICT meaningfully. This framework may have the potential to reshape how teacher educators understand and approach ICT in preservice programmes as it challenges add-on and decontextualised courses in ICT.

In summary, the beginning teachers in this study demonstrated a fragile conception of the meaningful use of technology. While this may be explained as a product of their relative inexperience, their rationales for ICT lacked an understanding of the political and economic drivers underpinning technology policies. They did not question ICT's role in relation to the deeper purpose of education. The majority had a technocentric view on the role of technology in school and an apparent lack of any clear statement on the purpose for ICT. The participants articulated a limited knowledge about the affordances of ICT in content knowledge and pedagogical considerations.

Impact of the Work Environment

This subsection discusses the impact of the conditions in the participants' work environment on their teacher development and the factors in the school environment that make support for ICT use most likely. Specifically, the focus is on school culture and mentoring. It considers the influence of a collaborative and supportive school culture compared with one that offering limited support for the participants' teacher development. It also considers the impact of mentoring on the participants' development as ICT-using teachers. Lastly, it discusses participants' mentoring experiences within their different school cultures.

Impact of collaborative and inclusive cultures

The literature review established that a school with an integrated professional culture was vital to beginning teachers' professional development (see p. 18). An important finding from this study was a strong correspondence between participants' reports that their school was supportive and inclusive with an integrated professional culture and a principal who was perceived to act as a professional and curriculum leader. This finding is in agreement with Alton-Lee (2003), who argued that school leadership was important in supporting and resourcing school programmes, and Kardos et al. (2001) (see: The influence of school culture on teacher development, p. 20).

In the present study, it may be inferred from the data and my own observations that a collaborative and inclusive culture permeated the work environment in Susan and Pam's schools as well as John's two-teacher school. The principals had a 'hands-on' style of leadership and engaged in professional and curriculum issues. The beginning teachers in these schools were not shielded from the demands of full-time classroom teaching although the class size in Susan and Pam's class sizes were relatively small. They were included in all the schools' activities as members of a community of

DISCUSSION

practice. As their individual accomplishments and talent emerged, they were provided with challenges within a supportive environment. For example, Susan was fortunate to be given responsibility for leading the school's Science Fair—an opportunity to learn, develop her identity as a teacher and grow into a leadership role, generally, and in ICT, in particular (Johnson & Birkeland, 2003).

A very different example of a collaborative and inclusive culture where the principal engaged with the beginning teacher was John in his two-teacher rural school. On the one hand, his teacher development benefited from the leadership opportunities presented by the small size of the staff, from professional development opportunities and from having an excellent professional relationship with his principal. On the other hand, his development was limited by the size of his school, which lacked the critical mass needed to constitute a community of practice. Models from which to learn were few and feedback was limited. By all accounts the principal tried to overcome these obstacles, which affected them both, by engaging with neighbouring small schools for joint planning and other professional purposes.

These examples of integrated and collaborative professional cultures demonstrate their positive influence on the participants' teacher development. They illustrate the impact of the principal as an active leader who engages with the school's beginning teachers. They also show the difficulty for beginning teachers in small rural schools.

Impact of school cultures offering limited support

The literature review identified several school culture types that tended to offer less support to their teachers: 'veteran', 'novice-centred' and 'comfortable' (see p. 18). While it was not possible to ascertain the exact type of school culture from the data gathered in this study, limitations to participants' sense of school-wide support were identified: lack of cohesion among staff; new staff members' lack of institutional

DISCUSSION

knowledge; a sense of isolation; the principal as leader of the school delegating responsibility; and the limited options for support in small rural schools with few staff.

These issues affected the majority of the participants to varying degrees. For example, Arnold's syndicate had a number of new staff members including the part-time syndicate leader and two beginning teachers. A sense of isolation and lack of connection with colleagues limited his development of confidence as a first year teacher. Paradoxically John, who was teaching in the smallest school of the sample, reported a greater sense of support and professional opportunities than Arnold in his large school.

While school culture has been shown to be highly influential on beginning teacher development, some of the participants' experiences also have to do with the characteristics of the person (Gratch, 2001). For example, perceptions of what constitute appropriate requests from a beginning teacher made Kay reluctant to ask for a printer for her classroom. She felt that as a newcomer she should not be demanding. The point is that Kay's perception of what was appropriate could either be due to her personality or the unspoken rules imparted by the school's culture.

The predominant issue for those who found themselves in apparently unsupportive school cultures or who were lacking tutor teacher support was that the principal had delegated pedagogical and curriculum leadership to others. In these cases, the school was often large; however, size cannot have been a determining factor, as two large schools in the study did provide excellent support. As Cochran-Smith (2004) asserts, "Teachers need school conditions where they are successful and supported, [and have] opportunities to work with other educators in professional learning communities rather than in isolation" (2004, p. 391). These were not the conditions experienced in the work environment of the majority of my participants.

Impact of mentoring practices on the participants' development

Induction and mentoring of a beginning teacher is sometimes claimed to be the responsibility of the whole school (Johnson & Birkeland, 2003). On this view, it could

be argued that a symbiotic relationship exists between school culture and mentoring. This position is supported by a pattern that emerged from the findings: where the participants reported that their school had a culture of support, they were likely also to find their tutor teacher supportive. For example, Mary said her tutor teacher was very supportive and “that kind of goes generally for the whole staff, really, here” (Interview 2).

Conversely, in those cases where the participants reported their tutor teachers' support to be problematic or lacking, the participants also received minimal support from their colleagues. This was so for Annabel whose tutor teacher was also the assistant principal—often unavailable and without a class of her own. Annabel could therefore not observe her tutor's teaching, typically part of a planned programme of advice and guidance. In fact, only three of the participants said they had observed either their tutor teacher or another teacher teaching, with or without ICT. Such observations occurred in three of the four schools with an integrated professional culture and the principal as curriculum leader.

Another pattern that emerged from the findings was that where the participants reported a school culture of support in ICT, they also experienced support in ICT from their tutor teacher or a colleague. Two of the participants in fact preferred to take their questions about ICT to a colleague rather than their tutor teacher. Pam, for example, would rather ask a colleague who taught in the classroom next to hers and was part of her syndicate. However, this form of collegial support may only address more immediate and practical needs (Day, 1999). Nevertheless, Johnson and Birkeland

DISCUSSION

(2003) argued that instead of one-on-one mentoring, schools were better to promote an integrated professional culture with a rich discourse amongst all its members.

Although some of the participants in this study described positive experiences with supportive mentor teachers and other colleagues, the literature review found that beginning teachers need more particular 'advice and guidance' from their mentors (see p. 48). They need mentors who understand the conceptual differences between their own thinking and that of a beginning teacher (Meskill et al., 2002). With this awareness, the mentor teacher can break down and explain their reasoning, inferences and actions to which the beginning teacher would otherwise have no access (Huling-Austin, 1992). Mentor teachers can also ensure that beginning teachers are given opportunities to observe experienced colleagues, with and without ICT; opportunities to enact and practice their insights; and opportunities for an ongoing dialogue about pedagogy and curriculum. These are deeper processes to which none of the participants in the current study made reference. As far as mentoring in ICT is concerned, it is noteworthy that several participants said they had never discussed technology with their tutor teacher.

A disappointing finding was the absence of professional development in technology for the majority of the participants. Some did not appear to see ICT as a pressing need. For example, Arnold explained that his access to professional development in ICT was limited "because we are doing the numeracy project and we are only allowed to have that as our development this year" (Interview 1). Pam's school was more accommodating: "If I want to go on courses [in ICT], I can have it" (Interview 1). It was paradoxical that those schools which offered opportunities for professional development were the ones where it was less needed.

To summarise, several patterns emerged from the findings. Firstly, there was a marked correspondence between an inclusive school with an integrated professional culture and the principal as professional and curriculum leader. Conversely, in schools

DISCUSSION

with less supportive school cultures or who were lacking tutor teacher support processes, the principal had delegated the role of pedagogical and curriculum leader to others.

Secondly, where the participants reported their school to have a culture of support and collegiality, most found their tutor teacher to be supportive. Conversely, participants who reported that their tutor teachers' support was lacking also received minimal support from other colleagues.

Thirdly, where the participants reported a school culture of support in ICT, they also experienced support with technology from their tutor teacher or a colleague. Research suggests that schools are better to promote an integrated professional culture with a rich discourse amongst all its members than to focus on one-on-one mentoring (Weiss, 1999) which to a large degree is in agreement with the findings here.

Lastly, an important finding of this study is that a 'near-perfect' experience of support and mentoring in ICT was apparent for only two of the eight participants in this study. While the size of the study makes it difficult to generalise, the data provided enough evidence to suggest that a connection exists between school culture, the principal as curriculum leader and the meaningful use of ICT. Just as mentoring generally cannot be left to only one person, we cannot expect a tutor teacher in a school with or without an ICT culture to provide all the support a beginning teacher needs in order to make meaningful use of technology in the classroom a reality. This raises the potential for developing an online community, facilitated by experienced teachers, to support beginning teachers through the first few years of their career.

Factors that Influence Beginning Teachers' ICT Self-Efficacy Beliefs

The literature on beginning teachers' self-efficacy beliefs in ICT is limited and did not come to my attention during the literature search phase. However, during the

DISCUSSION

data analysis it became evident that self-efficacy was a dominant theme that needed to be articulated in the findings. In this section, therefore, the theory of self-efficacy will be used to explain or make sense of some of my participants' experiences.

Self-efficacy theory is a concept from social cognitive theory made prominent by the work of Bandura (1977; 1986, 1997). Self-efficacy theory is concerned with “people’s beliefs in their capabilities to produce desired effects by their actions” (Bandura, 1997, p. vii). According to Bandura, self-efficacy theory determines how people think, act, feel and motivate themselves. People with strong self-efficacy beliefs regard new tasks as challenges to overcome and succeed in, and they will expend more effort to achieve success. Their self-efficacy beliefs are not diminished by failure and over time their capability and resilience increases. On the other hand, people with low self-efficacy beliefs doubt their capability and regard challenges as threats. They are reluctant to try new tasks and give up if they fail. Self-efficacy theory is relevant to my study in that it can help frame the participants’ experiences in ways that throw new light on their teacher preparation and use of ICT as beginning teachers.

Self-efficacy belief is a perception of capability, not actual ability. Regarding their capability to use ICT, most of the participants in this study had a perception of themselves as either ‘moderately experienced’ or ‘very experienced.’ However, when confronted with the realities of the classroom fewer than half found themselves able to “organise and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). The participants’ shift in perception can be explained in a number of ways. The most apparent reason is that self-efficacy is a perception of competence, not actual ability. Another possibility is that the stress of first year teaching may have weakened their sense of competence and resilience. Contextual factors such as access to resources and the support of colleagues have also been found to influence beginning teachers’ self-efficacy beliefs (Tschannen-Moran & Woolfolk Hoy, 2007).

DISCUSSION

Self-efficacy is influenced by four types of experiences: enactive mastery experiences, vicarious experience, verbal persuasion and physiological and affective reactions (Bandura, 1997). *Enactive mastery experiences* are the most influential sources of efficacy belief because they are based on actual, authentic experiences. Performance success on such tasks raises efficacy beliefs, while repeated failures lower them, in particular early in the learning process. It is therefore important that beginning teachers experience success in their first year of teaching, in general and with ICT, as beliefs are difficult to influence once they are entrenched. This has implications for mentoring in ICT, school leadership and culture and preservice teacher education.

The practicum is the setting in which preservice teachers have opportunities to enact authentic mastery experiences with ICT supported by the lecturer and associate teacher's guidance. However, my participants' opportunities for mastery experiences were severely limited. For example, Mary's college lecturers encouraged her to use ICT on practicum. She planned a literacy unit but did not have the opportunity to use it. Lucy and Annabel were exceptions in that their associate teachers on practicum relied on them 'to do all the ICT,' which increased their self-efficacy beliefs. They simply taught what they knew. While these experiences may have increased their self-efficacy beliefs, they also served to endorse their own narrow technology experiences with TIM as students.

According to Enochs and Riggs (1990) mastery experiences and modelling can be blended into current programmes through microteaching—"a scaled down teaching encounter" (Allen & Eve, 1968, p. 181)—and practicum experiences. As self-efficacy beliefs are domain specific (Bandura, 1977) teacher educators need to be aware of their students' self-efficacy beliefs in ICT and ensure they have experiences that will have a positive influence. A relevant fact is that teachers generally choose to spend less time teaching in domains of knowledge where their self-efficacy is low (Enochs & Riggs,

DISCUSSION

1990). Associate teachers at the practicum level and mentor teachers at the school level could use this characteristic to ensure preservice and beginning teachers receive appropriate support.

A second source of self-efficacy is *vicarious experience* from the observation of accomplishment by others. When modelling is carried out by people similar to oneself, accomplishments are judged as an indication of one's own capability and self-efficacy is thus raised. Multiple competent models have the greatest effect.

Lecturers' modelling of technology use in preservice teacher education has been cited as one way to increase preservice teachers' tacit understanding about using ICT in their future classrooms (Pope et al., 2002). However, lecturers' modelling for the participants in this study was limited as explained by Pam:

We usually watched through Technology—a lot of it was watching through PowerPoint, yes, we had PowerPoints. With maths lecturers we observed using a PowerPoint, because that was what all the lecturers used, most of it. Then there were overheads, you know, that sort of technology. There wasn't, yes, it was mainly PowerPoint, when I think about it. (Interview 1)

This example suggests that thought needs to be given to modelling a variety of technologies that are appropriate for use in a primary classroom environment.

Vicarious experiences can also occur in the form of modelling recorded on video. Research by Wang, Ertmer and Newby (2004) found that such vicarious technology learning experiences and goal setting influenced preservice teachers' self-efficacy for ICT use in the classroom. In their study, two groups of preservice teachers were asked to watch either an instructional video featuring ICT practices and beliefs of six teachers or an educational WebQuest¹⁶ website. The video group had access to documentary evidence such as lesson plans. They were also given a list of goals to consider; for example, the way the teacher organised technology-based class activities.

This video activity represented vicarious learning. The other group was asked to visit

¹⁶ "An inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet" (<http://www.webquest.org>).

DISCUSSION

the WebQuest website and given tasks such as determining the instructional goal. No actual modelling took place—an essential characteristic of vicarious learning—and no goal setting. The findings were that self-efficacy beliefs increased significantly for the group with vicarious learning experience compared to the WebQuest group. The increase in self-efficacy was greatest when vicarious learning was combined with goal setting.

The findings of my study showed that based on self-report data modelling by the participants' associate teachers as a possible source of self-efficacy beliefs was limited and were therefore unlikely to have greatly influenced the participants' efficacy beliefs in ICT. Wang, Ertmer and Newby's (2004) research suggests there is every reason to consider the possibilities for vicarious experiences in preservice teacher education. This would partially offset the lack of opportunities for preservice teachers to observe experienced associate teachers using ICT during their practicums.

A third source of efficacy beliefs is *verbal persuasion* in which others guide individuals to believe in their own capabilities. This is less influential on efficacy beliefs than personal experience, because outcomes are not witnessed but discussed. Verbal persuasion can, however, encourage efforts that are more likely to increase efficacy through success. This requires that a relationship of trust exists with the advocate. Verbal persuasion from mentor teachers or colleagues may give beginning teachers encouragement that will have an effect on how they perceive their capabilities or adequacies to use technology for particular purposes. For example, verbal persuasion might have been a useful strategy for Kay's tutor teacher or syndicate colleagues to use when she was struggling with a school-wide learning activity with ICT. Instead, she relied on her flatmates.

Finally, *physiological and affective reactions* such as stress influence self-efficacy beliefs. Preservice teachers on practicum as well as beginning teachers are

DISCUSSION

susceptible to the interpretation of stress as a sign of their vulnerability to poor performance (Bandura, 1994). Self-efficacy beliefs can be enhanced if stress reactions can be reduced. However, Bandura argues that it is not the stress itself but how it is interpreted that is important. People with strong self-efficacy beliefs may interpret the affective state of stress as stimulation. For example, in the present study Susan thrived on a high level of affective arousal during the stressful weeks of being in charge of her school's science fair. In contrast, people who experience self-doubt may interpret their affective state as an impediment. This was seen in Annabel's experience of being required to use an electronic whiteboard in the school's computer lab. She had never used one before and felt embarrassed in front of the students, especially as they already knew how to use it. As she gained some experience with the technology, she said she felt more confident.

To summarise, self-efficacy theory is concerned with people's belief in their competence to carry out actions to their desired conclusion. This theory is useful in theorising some of the findings in this study because it can shed new light on important aspects of preservice teacher preparation in ICT and the way beginning teachers subsequently approach their use of technology.

Self-efficacy belief is the perception of ability to succeed, not an individual's actual ability. Four types of experiences influence self-efficacy: enactive mastery experiences, vicarious experience, verbal persuasion and physiological and affective reactions. Mastery experiences are the most influential and physiological and affective reactions the least powerful.

Mastery experiences are the most influential source of self-efficacy beliefs. However in this study opportunities to develop self-efficacy in ICT through authentic mastery experiences in the practicum were limited. The participants commented that many teachers do not use technology to any great extent. While this type of self-report

DISCUSSION

data is not totally reliable, opportunities exist in preservice teacher education for increasing self-efficacy beliefs in ICT through vicarious experiences, for example through videos showing experienced teachers using technology in the classroom.

Although verbal persuasion is less powerful than mastery experiences in influencing self-efficacy, it is one way tutor teachers and colleagues can support beginning teachers.

Lastly, stress was found to be both an enabling and a limiting factor in some of the participants' experiences. Stress influenced self-efficacy positively when interpreted as stimulation but limited self-efficacy when it caused self-doubt.

Lessons for Preservice Teacher Preparation in ICT

This section examines the participants' reflections on their preservice preparation in ICT. It presents the implications of their reflections for teacher education and concludes with the clear message that teacher educators can do better in preparing future teachers in ICT.

Reflecting on their preservice preparation in ICT, the participants of this study made a number of observations. Some had not realised how much technology was used in schools or, in Arnold's words, how much they were going to need ICT. Why was this the case? Albeit speculative, it might be that ICT was seen as having its 'natural home' in the technology department, a separate curriculum area of the New Zealand Curriculum in its own right. Possibly the participants had not experienced ICT as an integral part of teaching and learning on their practicums, or ICT might have had a peripheral role in their preservice programme (Brown & Warschauer, 2006). This last point was illustrated by Kay: "I remember the subject courses and I can't even remember that they had one for computers. It was all, like, art, PE [physical education] and—I don't think they did have one for ICT" (Interview 1).

DISCUSSION

It appears that schools, whatever their stage of ICT development, expect new teachers to have the skills and understandings to use technology meaningfully in their classroom programmes. However, the practicum experiences of participants in this study suggests that paradoxically, the schools' existing teachers may not have these skills and understandings

A related observation concerns the perceived low level of practical ICT skills and knowledge of some of the participants. Several had missed the technology assessment test that determined their level of skill in ICT. If found wanting, they would have been obliged to take the introductory technology course. Arnold was never assessed and thus fell through the 'ICT net.' As a beginning teacher he described his skills and knowledge with ICT as 'very limited' and that he had not been 'one hundred percent sure' what he was doing. In retrospect, John believed the test was too easy. As a beginning teacher he found his knowledge 'hit and miss,' which restricted his use of ICT in the classroom. Despite these sentiments, it has been widely argued that a single technology course cannot adequately prepare preservice teachers in technology (Hargrave & Hsu, 2000; Pope et al., 2002; Strudler et al., 2003).

At the risk of over generalising, the lessons for teacher preparation are two-fold. Firstly, preservice teacher education needs to have a comprehensive and robust process of assessing preservice teachers' prior knowledge of ICT. Secondly, preservice teachers need more and varied opportunities to learn about using ICT in teaching and learning. This will require greater integration of technology in preservice courses where the affordances of ICT in the curriculum can be explored in relation to "content knowledge that embodies the aspects of content most germane to its teachability" (Shulman, 1986, p. 9). The concept of technological pedagogical content knowledge (TPCK) holds promise in this regard.

DISCUSSION

Although Albion (2001) asserts that a single course can enhance self-efficacy, the question is not only whether technology learning opportunities give preservice teachers the skills they need, but whether they also provides opportunities for strong self-efficacy development. One element of self-efficacy theory holds that the strength of self-efficacy belief affects coping skills and resilience (Bandura, 1977). As self-efficacy is a motivational construct, those with strong self-efficacy belief will expend more effort and persist in the face of adversity, while those with a weak self-efficacy are likely to give up and thus enhance their self-doubt.

In this study, the perception of ICT efficacy of most of the participants changed markedly over the course of the research. They experienced a drop in ICT self-efficacy as they gained more experience in classroom teaching. However, some regained their perception of competence over time. Annabel's situation illustrated strong ICT self-efficacy belief. Her self-efficacy decreased when she was confronted unfamiliar technology. However, with effort and perseverance she regained, and thus strengthened, her self-efficacy. In contrast, the drop in ICT self-efficacy in other participants can be explained, albeit tentatively, by the perception of failure with technology and subsequent lack of coping effort (Tschannen-Moran & Woolfolk Hoy, 2007).

The lesson for teacher preparation is that preservice teachers need not only develop self-efficacy beliefs in ICT but more importantly strong self-efficacy of practice. This is achieved through repeated successes. We know from Bandura's work that enactive mastery experience is the most powerful source of self-efficacy. It is therefore vital that preservice teachers have opportunities to practise the meaningful use of technology in authentic situations on an ongoing basis. As discussed earlier, the practicum provides the ideal opportunity for this experience. It is therefore important that teacher educators liaise with schools and associate teachers to ensure there is

DISCUSSION

agreement about the importance of preservice teachers using ICT in meaningful ways over the course of each practicum.

A negative disposition to ICT during their preservice period was a further observation made by two of the participants. For example, Kay illustrated her disposition towards technology as a preservice teacher when she said, “If I had heard them talking about technology I would have said, ‘Oh, I don’t want to do that’” (Interview 1), while Arnold said, “To be honest, I actually hated it in my preservice teacher education. Sorry—I think, because it was actually drummed into us” (Interview 1). Their negative disposition proved to be of great consequence to them both because it influenced their ability to see the possibilities ICT may afford. Their disposition was further entrenched by their experience of technology use on practicum and in their preservice classes. For example, Arnold explained that on a practicum posting he “didn’t really see too much going on there” (Interview 1) and could not remember if there was a computer in the classroom. Both participants graduated with minimal skills, knowledge and understanding in ICT, which affected their work as beginning teachers.

Teacher educators can neither assume all young people are technologically competent—that is, ‘digital natives’ (Prensky, 2001)—and interested in ICT outside their personal use; nor that they see a connection between their personal use and that of classroom use of technology. As preservice teachers’ dispositions are coloured by their individual prior experiences, whether positive or negative, teacher educators need to make sure their technology use is not seamless, that is to say that their ICT use is neither taken-for-granted nor promoted as unproblematic (Keating & Evans, 2001). Teacher educators must expose their students to complex issues: why use technology in schools? For what purpose, and where is the evidence of its benefits? Preservice teachers need opportunities to actively construct their own informed opinions and perspectives on these matters.

DISCUSSION

The feedback from the participants about what they would have liked to learn more about during their preservice education focussed on two areas. One concerned functional aspects of ICT such as knowing what computer applications schools use. The other emphasised the practical and pedagogical issues in how to use technology in the classroom. The participants would have liked to observe actual lessons that demonstrated the meaningful use of technology in the classroom. Some expressed disappointment with what they perceived as inadequate preservice preparation in ICT, and the resulting challenges they faced when using technology in their first year as classroom teachers.

If these perceptions are borne out by further research, lessons for teacher education could not be clearer. Beginning teachers want to know how to use ICT in their teaching and learning programmes even if they do not always realise the importance during preservice teacher education. To feel less than adequately prepared in ICT is a substantial disadvantage for beginning teachers and also disadvantages their school. Tutor teachers and schools are not always able or willing to support their beginning teachers' professional development in ICT to the extent that may be needed. The success of some teachers in this study in becoming competent ICT-using beginning teachers was more often than not because of their prior knowledge. As Susan said, "All the knowledge that I left with I pretty much gained prior to coming to the teacher education institution" (Susan, Interview 1). ICT is not a peripheral topic that can be covered in a few workshops. Questions such as "How do I teach it?" have theoretical underpinnings to be analysed and linked to practice, pedagogy, curriculum and the wider concerns of the educational endeavour (Beck, Kosnik, & Rowsell, 2007).

That there are no easy answers to the question of how best to prepare preservice teachers in ICT is well documented in the literature (see p. 35). However, few studies have sought the views of beginning teachers on their sense of preparedness to use ICT.

DISCUSSION

Reflections on preservice preparation in technology by the beginning teachers in this study have documented how well they feel their preservice experiences prepared them in ICT and what they perceive their needs to be. The message is that teacher educators have to do more to ensure preservice teachers gain the understandings, knowledge and skills they need to become successful ICT-using beginning teachers.

In summary, this section examined the study participants' views on the adequacy of their preservice preparation in ICT. It discussed a number of the observations they made. Firstly, some participants were unaware as preservice teachers how much ICT was used in schools and therefore paid little attention to its potential during their preservice teacher education. Secondly, the initial assessment of their technology skills by the preservice teacher education institution was reportedly inadequate, with unfortunate consequences for the individuals concerned. Thirdly, preservice teachers need to build strong efficacy beliefs, which require teacher educators to liaise with schools and associate teachers to ensure there is agreement on the purpose and aim of practicum experiences in ICT. Lastly, in retrospect the participants would have liked to learn more about technology, and especially to have observed how teachers use it in the classroom. The section concludes with a clear indication that beginning teachers want to be well prepared in ICT and it is suggested that teacher educators can do more to ensure this is the case.

Chapter Summary

This chapter interpreted and discussed the findings of this study of eight beginning teachers experiences with ICT during their first year of teaching. The discussion was presented under five meta-themes. Firstly, the participants' awareness of ICT policies for schools was considered. They demonstrated no knowledge of national ICT policies in education and saw technology use in schools as unproblematic. Without

DISCUSSION

strategic knowledge to analyse the assumptions that underpinned their views on technology, they were unable to problematise and articulate their work in relation to the pervasive debate about ICT.

Secondly, the participants' understanding of technology's role in teaching and learning was examined. A mixture of rationales underpinned their perceptions about the role of ICT in schools, dominated by future-oriented and vocational rationales. They demonstrated no awareness that their work connected to the wider political and economic context of education and did so in unintended ways. The participants' technocentric conceptualisation of ICT and its role in the teaching and learning process was discussed.

Thirdly, the chapter discussed the impact of conditions in the work environment on beginning teachers' development. Collaborative and inclusive cultures offered most support to the participants. It was proposed that a symbiotic relationship exists between school culture and mentoring. The discussion explained an apparent pattern in the findings that linked collaborative and inclusive cultures with the principal as professional and intellectual leader of the school. A further link to this 'winning combination' was a supportive tutor teacher. Support in ICT from the tutor teacher or colleague was strongest in schools with a school-wide culture of support in ICT. However, only two of the eight participants were placed in schools where this culture was present—based on self-report data.

Fourthly, factors that influence beginning teachers' self-efficacy beliefs about ICT were identified and discussed in relation to the findings. Recommendations in the light of these findings included the need to improve preservice teachers' opportunities for enactive mastery experiences with technology and the inclusion of vicarious modelling using video in teacher preparation in ICT.

DISCUSSION

Lastly, a number of lessons for preservice teacher education in ICT were identified based on the participants' reflection on the adequacy of their preservice preparation in technology. Some of the participants had not realised how important ICT was going to be for them. Some had a negative disposition towards technology. Having rarely seen technology used on practicum, they were able to ignore ICT until they took up their first teaching positions. Their preparation in ICT did not serve them well. They regretted not learning more about technology, and would have liked above all to have observed experienced teachers using ICT in the classroom. The discussion concluded with two observations: These beginning teachers wanted to be well prepared in ICT and their teacher educators and associate teachers could have done more to ensure this was the case.

The following chapter reflects on the study as a whole, including its contribution and limitations. The chapter also considers the implications for future policy, practice and research that arise from the data analysis and discussion, and makes recommendations in each of these areas.

CHAPTER SEVEN

CONCLUSION AND IMPLICATIONS

This last chapter reviews the study as a whole. First it summarises the study in terms of its stated research aims and process. The chapter then reflects on the research questions and provides a summary of the key findings and the degree to which the objective of the study has been met. The study's contribution to the limited knowledge about beginning teachers' use of ICT is considered. Next the chapter identifies limitations associated with the scope of the study and the necessarily tentative nature of the findings. The implications of the research for beginning teachers, tutor teachers, principals, teacher educators and policy makers are discussed and suggestions for further research made. Some final thoughts conclude the chapter.

“It's no use asking us when we graduate because we don't know what we need then. We only know that when we begin teaching.” (Kay, Interview 2)

Introduction

This final chapter reviews the key findings of the study and reflects on the extent to which the research has succeeded in achieving its objective. A summary of the research aims and methodology is provided. Reflection on the research questions and a summary of the key findings are outlined. The chapter then considers the study's contribution to the limited knowledge about beginning teachers and their use of ICT. The study's limitations are noted and the implications for policy and practice discussed, followed by recommendations for further research. The chapter ends with some final thoughts on how to improve the preparation of beginning teachers for meaningful ICT use in their classrooms. A number of changes have occurred in the field of policy and

CONCLUSION AND IMPLICATIONS

practice since the fieldwork for this study was carried out. These change are described in a Postscript that follows this chapter.

The Study

This thesis investigated the conditions under which beginning teachers are expected to exploit the potential of ICT in the classroom. It examined their reported experiences of coming to terms with understanding how learning happens in the classroom with the affordances of ICT. A lack of empirical evidence in this area demonstrated the need to investigate beginning teachers' experiences with ICT and the personal and professional factors that contribute to their use of technology in classroom settings. Furthermore, relatively little is known about whether preservice teacher education in ICT adequately prepares new teachers to use technology in the classroom. To address this gap in the literature the study examined beginning teachers' preservice preparation in ICT and investigated their dispositions and understandings, actions and work conditions over the first year of their practice.

It is important to acknowledge that I came to the investigation of this problem with my own experiences as a learner, a teacher and a teacher educator, as described in Chapter One. Hence, my interests and experiences have shaped the study. My orientation as an educator, underpinned by the view that teaching is complex, has also influenced the choices I made throughout the research process.

I chose a qualitative approach because the methods of this approach enabled insight into the personal, biographical and contextual factors that impacted on beginning teachers' decisions about how and when to use ICT, and why or why not. In order to reflect the personal variation of these factors, individual portraits of each research participant were provided. A semi-structured interview and a photo-interview—with the photographs taken by the participants—enabled me to hear the teachers' own stories

CONCLUSION AND IMPLICATIONS

and accounts of their experiences. A theoretical framework based on an interpretivist perspective underpinned the research. This perspective holds that meaning grows out of social interactions while placing emphasis on the context and experiences of individuals. The data analysis employed the constant comparative method. Through this process seven salient themes emerged, isolating the complexities of beginning teaching.

Reflecting on the Research Questions

This study set out with the overarching objective of investigating beginning teachers' experiences and perceptions when they incorporate ICT into the teaching and learning process in the classroom. The findings have provided evidence to suggest that beginning teachers' experiences with (and without) ICT are complex, and that beginning teachers face many challenges when they attempt to use ICT in their classroom programmes.

In particular, the research sought to investigate beginning teachers' perceptions about ICT, their understandings about its role in New Zealand schools and their awareness of national and school policies for ICT. The findings suggest that beginning teachers may lack strategic knowledge to decode the sometimes conflicting messages about ICT in national and school policies. The conceptions about ICT in teaching and learning among the participating beginning teachers appear to be fragile and based on a mix of technocentric rationales. Some individuals were therefore unable to make a connection between their work as teachers and the broader policy goals for education.

Another important question the research aimed to examine was the personal and contextual factors that contribute to or constrain beginning teachers' successful use of technology in teaching and learning. The findings suggest that beginning teachers need a high level of complexity in their ICT knowledge, skills and understandings. Further, the findings highlight the importance of school culture, leadership and support for

CONCLUSION AND IMPLICATIONS

beginning teachers in their journey towards becoming competent ICT-using teachers. The nature of this study has suggested that personal biography and prior experience may also significantly affect ICT understanding and use.

Finally, the research sought to understand beginning teachers' sense of preparedness as new graduates to use ICT meaningfully in their classroom programmes. The findings indicated that participants felt they had limited opportunities to learn about ICT during their preservice teacher education. They judged the entry assessment of their ICT skills too simple, and the number of courses with ICT content were limited. Mastery experiences on practicum were rare and participants' ICT self-efficacy beliefs were attributed to prior learning. Although it is not clear whether these results can be generalised to graduates of other New Zealand preservice programmes, the unequivocal message to teacher educators is: preservice teachers wish to learn about ICT, to be well prepared to use ICT in their future classroom and to be helped to understand the relevance of technology in schools.

In summary, the study was successful in obtaining answers to the research questions and has resulted in a number of tentative implications for beginning teachers, tutor teachers, principals, teacher educators and policy makers. Further research is needed, however, in order to be able to draw firm conclusions about the usefulness of these findings.

Contribution of this Study

The study has made four contributions to the knowledge base about beginning teachers' experiences when they use technology in the classroom. Firstly, it has identified that a clear gap exists in the literature regarding beginning teachers' use of ICT and it has in its own small way contributed to filling this gap. Secondly, it has opened a new line of research around the importance of school culture and identified the

CONCLUSION AND IMPLICATIONS

type of contexts in which support for beginning teacher development in ICT is more likely to occur. Thirdly, it has added to our knowledge about the value of induction and mentoring of beginning teachers in ICT. Lastly, within the context of one small-scale study, it has documented the sense of preparedness in ICT of a group of beginning teachers and how this influences the nature of their first year teaching experience.

Future research might consider selecting a larger sample from a broader range of preservice programmes and school settings to test the current findings. The sample might usefully be further differentiated by age, gender, ethnicity and prior experience with ICT, and schools differentiated by decile, size, rurality and ICT capability. Longitudinal studies tracking personal development as technology-using teachers over a longer period of time would be particularly useful to an understanding of the relationship between prior experience, preservice education, provisional registration and subsequent self-efficacy as teachers. In this sense, the thesis has contributed valuable signposts to areas of further research in what remains a relatively unexplored field of study.

Limitations of this Study

Before reflecting on the implications of this study, it is important to identify a number of limitations. Firstly, photo-interviewing was chosen as a data gathering technique, as direct observations were not feasible within the scope of this study. While a pilot study was not practicable it was anticipated the photographs would capture classroom activities with ICT and help bring the teachers' perspectives into the interview. Although the photographs gave the participants the opportunity to explain their learning intentions and practice with ICT, they did not capture the richness of teaching and learning anticipated. One reason could be that some participants were too busy teaching to capture the most salient moments of technology use on film, or simply

CONCLUSION AND IMPLICATIONS

forgot. A negotiated reminder system such as a text message or email might have been helpful. It is also possible that my expectations of the beginning teachers' meaningful ICT use were too high. Secondly, the sample had no Māori or Pasifika teacher representation. This was, in part, due to the cohort from which the sample was drawn having very few Māori and Pasifika preservice teachers, the institutional restriction in my access to the participants and the fact that participation was voluntary.

Thirdly, gaining access to those participants who had originally expressed an interest in participating in the research was in some instances difficult. The response to the letter of formal invitation to participate in the research was slow, impeded by school camps and other activities. In several cases the invitation did not reach the beginning teacher because the principal pre-empted this process by simply asking the beginning teacher directly. As a result, two principals informed me that their beginning teachers declined.

Fourthly, the study draws extensively on self-reported data and beginning teachers' perceptions of tutor teachers, principals, colleagues, work environment, and so on, and thus may not be entirely trustworthy. It was beyond the scope of the present study to validate these perceptions through first hand observations and interviews with some of these stakeholders.

Finally, it follows that generalisations from this study are limited by several factors. The sample was small and the participants were drawn from a single New Zealand preservice teacher education institution. The findings can therefore not speak for all New Zealand beginning teachers. However, through the detailed reporting of the findings of this study, the reader can determine whether the findings may be applied to similar situations and settings. Equally, the findings of this small-scale study add to our knowledge and suggest several directions for further research.

Implications for Policy, Practice and Future Research

The findings from this study, if supported by further research as suggested above, have implications for beginning teachers, tutor teachers, principals, teacher educators and policy makers, at least in terms of asking more informed questions. For beginning teachers this research suggests that while the quality of mentoring and support rests in great part on principals, teachers and the schools they are first employed in, beginning teachers also need to be proactive in ensuring that their mentoring and support needs are met. They can, for example, ask questions during the recruitment process about the school's mentoring policies and support for beginning teachers' professional development. In regard to ICT, they can ask what access they are likely to have to technology and what support and professional development opportunities in ICT the school provides. They can also proactively expand their professional networks; for example, join a beginning teacher online mentoring network. Within their school, they can seek out and build supportive relationships with like-minded colleagues. These are simple, practical steps that could be taken to fill some of the gaps identified in this study.

For tutor teachers the research underscores the professional responsibility they have to ensure that beginning teachers are well supported through a jointly negotiated teacher development plan, which includes technology. The findings suggest that tutor teachers have to engage more fully in professional dialogue with their beginning teachers. To do so they need to understand the conceptual differences between their own thinking and that of a beginning teacher and make overt their reasoning, inferences and actions to which the beginning teacher otherwise has no easy access. In the context of ICT, tutor teachers must ensure beginning teachers have opportunities to observe, work alongside and have an ongoing dialogue with experienced technology-using colleagues about teaching and learning with ICT.

CONCLUSION AND IMPLICATIONS

Needless to say, principals have a similar responsibility. The findings further suggest that the principal's leadership is vital in promoting a collaborative and collegial culture, where everyone takes responsibility for the support of beginning teachers by modelling professional practices and relationships. Principals must also make wise decisions about appointing tutor teachers. They need to ensure they maintain involvement with the mentoring process as they ultimately take responsibility for the beginning teacher's application for full registration based on evidence from the advice and guidance programme.

For teacher educators the implications from the findings of this study are clear. While beginning teachers can never be as fully prepared as those who are already practising teachers, their preparation in ICT must be adequate as a sound foundation for their future teacher development in technology. Acknowledging that solutions to preparing teachers in the use of ICT are complex, it is nevertheless important that teacher educators address the concerns identified in this study. Teacher educators need to examine their own practice with ICT and the messages they send to preservice teachers about the role and importance of technology in education; consider the relationship between pedagogical content knowledge and ICT in terms of the affordances of ICT in curriculum studies; reflect on what preservice teachers need to learn and understand in order to use ICT meaningfully, according to the recently developed TPCK framework; ensure preservice teachers have opportunities to build strong self-efficacy beliefs; and provide opportunities for preservice teachers to be actively involved in forming their own opinions about technology in schools from a critical perspective by examining the discourse of policy documents.

The findings also indicate that greater emphasis needs to be placed on preservice teachers seeing technology use being modelled meaningfully on their practicums. Furthermore, they need opportunities for enactive mastery experiences in the authentic

CONCLUSION AND IMPLICATIONS

context of a practicum classroom in order to build strong self-efficacy beliefs. Teacher educators cannot accomplish this alone but need to forge collaborative relationships with associate teachers and the host schools.

The study has several possible implications for policy makers. Firstly, the advice and guidance programme, which supports beginning teacher development, does not reach all beginning teachers in ways that supports their professional growth. To alleviate this problem, tutor teachers may need more guidance, for example in the form of mentor teacher qualifications. Principals, likewise, need support in establishing the kind of collaborative environment in which beginning teachers can thrive. Secondly, this study made the unexpected finding that preservice teachers may graduate without having observed ICT being used meaningfully in the classroom. They may graduate without knowing how to use ICT in their teaching and learning programmes. And they may graduate without understanding the New Zealand Ministry of Education's policy objectives for technology use in schools. It is evident that the preservice teacher education programme from which the participants graduated had left some beginning teachers inadequately prepared in ICT. Although the data in this study was collected in 2005, there is nothing to suggest the situation has changed greatly and the *Satisfactory Teacher Dimensions* and the *Fit to be a Teacher* criteria are still not explicit in regard to technology. Nevertheless, because employing schools expect new teachers to be competent in using ICT, the study may also have policy implications for the approval and re-approval of teacher education programmes by the New Zealand Teachers' Council.

As indicated above, however, the limitations of this study imply that further, more substantial research is needed from which generalisable findings may then be applied to beginning teachers, schools and the teacher education sector as a whole.

Final Thoughts

It is appropriate to leave the last word to one of the participants and her assessment of what beginning teachers need to know about ICT for first year teaching:

We need a beginning teacher to go back and tell them what we didn't get. . . . what we really need to know. The teacher education programme teaches you, really, the knowledgeable stuff, but they don't give you the basic things that a beginning teacher needs to be aware of, like integrating ICT into the programme. That's what we didn't get. (Annabel, Interview 2)

CHAPTER EIGHT

POSTSCRIPT

Time is the fairest and toughest judge.

–Edgar Quinet (1803–1875)

Introduction

Since this study was conducted a number new developments have occurred in the field. This postscript seeks to address the currency and contribution of the study to the field in light of the timeframe in which the data were collected. Specifically, the postscript centres on this question:

Five years on since data collection: To what extent are the findings, implications and recommendations still relevant and current?

To answer this question, the postscript describes recent developments in four areas: preservice teacher education; beginning teaching, mentoring and school leadership; policy initiatives and research reports in ICT; and the latest theoretical developments. In doing so, the implications and significance of this thesis in light of these developments are discussed. The chapter closes with a concluding statement.

Recent Developments in Preservice Teacher Education

Since 2004 when this study was conceptualised, a national review of New Zealand preservice teacher education was undertaken to facilitate policy development based on evidence (Kane, 2006). The review investigated the coherence between the espoused policy and practice of preservice teacher education institutions and their

philosophy, content, entry standards and graduating standards of each qualification.

Three findings of particular relevance to this study were: (1) primary preservice teachers have variable opportunity to strengthen their content knowledge; (2) the degree to which foundational studies in history, philosophy and sociology of education are included is either minimal or unclear; and (3) the study of ICT as a distinct area is evident in only two of the qualifications reviewed. The review also acknowledged that preservice teacher education is both complex and multi-faceted.

Three pertinent implications for preservice teacher education programmes from the national review are: (1) the need for greater conceptual coherence and curricular integration; (2) that programmes examine how preservice teachers are prepared in order to understand and use ICT to support learning; and (3) that attention is given to ways a shared vision can be developed for the whole period of teacher education, from preservice to full teacher registration (Kane, 2006). These findings and suggested implications support the outcome of this thesis and make the present research even more relevant to today's teacher education environment.

Since the review of preservice teacher education, two new developments have been initiated by the New Zealand Teachers Council: the development and implementation of a set of *Graduating Teacher Standards* (New Zealand Teachers Council, 2007), and new guidelines for the approval of preservice teacher education programmes that will incorporate the *Graduating Teacher Standards* (New Zealand Teachers Council, 2010a). All programmes will have to meet the new requirements by 1 January 2013.

The *Graduating Teacher Standards* recognise the need for graduating teachers to understand education within social, political, economic and historical contexts. This is in alignment with the recommendations of this thesis. However, it is unclear whether these new requirements take cognisance of Stephenson and Rio (2009), who argue that

in teaching courses in social and policy theory, the possibilities for critical engagement within preservice teachers education programmes are compromised because such issues are marginalised “almost to extinction” (Stephenson & Rio, 2009, p. 166). Furthermore, in their experience few preservice teachers have the capacity for critical engagement with the ideas presented in courses, a finding confirmed through many of the case studies contained in this thesis. Stephenson and Rio argue that many preservice teachers prefer the stability of the known and resist the exploration of unsettling and complex theoretical concepts. In this regard, Stephenson and Rio’s findings bring some uncertainty to the requirements of the *Graduating Teacher Standards* being met.

ICT is mentioned loosely in the *Graduating Teacher Standards*, where beginning teachers are expected to “demonstrate proficiency in . . . ICT appropriate to their role” (New Zealand Teachers Council, 2007, Standard 4 (d)). The type of proficiency called for is not defined. While this standard also expects graduating teachers to use content knowledge and pedagogical content knowledge in their planning, teaching and evaluation, there is no link made between these kinds of knowledge and proficiency in ICT. Although there are benefits in a lack of prescription, the Standards do not provide much guidance for teacher educators. Moreover, it is difficult to reconcile the ICT expectations of the Standards with the technocentric conceptualisation of ICT in *Guidelines for the Approval of Preservice Teacher Education Programmes*. The *Guidelines* state: “ITE [initial teacher education] providers must set a mastery level of Information Technology competency to be met prior to graduation from a programme. This will include the pedagogical application of Information Technology” (New Zealand Teachers Council, 2010a, p. 10). Firstly, it is startling that ‘Communication’ has been omitted from this statement in light of other policy documents promoting ICT and the ubiquitous use of *Web 2.0* applications that facilitate interactivity and collaboration. Secondly, the requirement has no strong

theoretical grounding and there is no evidence that this requirement has been informed by recent developments in the area. Thirdly, it is unclear what ‘pedagogical application’ means. If it means the meaningful use of ICT to promote student learning, a ‘mastery level of Information Technology competency’ is unlikely to achieve this on its own. Current research clearly indicates that decompartmentalising this kind of knowledge is ineffective in equipping new graduates with the transferable skills, knowledge and understandings needed to use ICT meaningfully for teaching and learning (Frank Bate, 2010; Jaipal & Figg, 2010; Katić, 2008). In many respects, this requirement reflects an instrumentalist view of ICT in preservice teacher education and ironically, in light of the earlier acknowledgement, fails to appreciate the complexity of the issue.

The evolving conceptual framework of Technological, Pedagogical and Content Knowledge (TPACK), which was introduced earlier in the thesis and is discussed in the last section of this postscript, offers potential insights into the kinds of knowledge teachers need to acquire to use ICT for teaching and learning. While it is difficult to predict what impact these latest policy developments will have on future beginning teachers’ ability to use ICT meaningfully, the insights offered in this thesis remain highly relevant to debates around different models and approaches to preservice teacher education.

Recent Developments for Beginning Teaching, Mentoring and School Leadership

Following the Education Review Office (ERO) report (2004) on the induction of beginning teachers, the New Zealand Teachers Council commissioned research to investigate the nature of advice and guidance programmes for newly qualified teachers. This research programme, *Learning to Teach*, was carried out between 2006 and 2008 and comprised of three stages: a literature review (Cameron, 2007); a national survey of provisionally registered teachers’ experiences of advice and guidance practices and

programmes (Cameron, Dingle, & Brooking, 2007); and case studies aimed at identifying good induction practices (Aitken, Ferguson, McGrath, Piggot-Irvine, & Ritchie, 2008).

The experiences of beginning teachers in Cameron, Dingle and Brooking's (2007) study indicated that a significant number did not benefit from a mutually planned induction programme aimed at their specific needs to which they were entitled. This finding corresponds to the findings of this thesis.

Key findings in exemplary induction practices from Piggot-Irvine, Aitken, Ritchie, Ferguson, and McGrath's (2009) research were the importance of beginning teachers having access to a community of support, while a key limitation was lack of time for discussions and observations of the beginning teacher's practice. These observations are well known and confirmed by the literature and amplified through the findings of this thesis.

The *Learning to Teach* findings contributed to the development of a set of *Draft Guidelines for Induction and Mentoring Programmes and for Mentor Teacher Development* (New Zealand Teachers Council, 2009a), which were to be trialled as pilot programmes in six Auckland primary and intermediate schools over two years. The pilot programmes focus on mentor development within a whole school approach to the induction and mentoring of beginning teachers. This approach was founded on two premises for beginning teacher induction to succeed: school leaders must participate actively in beginning teacher learning and development, and mentors must engage in their own learning and development (New Zealand Teachers Council, 2010b). The *Draft Guidelines* contend that providing emotional and just-in-time support is not a sufficient role of a mentor. Rather, a mentor is described as "an experienced colleague who is skilled and resourced with time, recognition and training to guide, support, give feedback to and facilitate evidence informed, reflective learning conversations with the

PRT [provisionally registered teacher]” (New Zealand Teachers Council, 2010b, para. 4). With the greater involvement of school leaders and proposed mentor training, the *Draft Guidelines* have the potential to overcome the shortcomings in the induction and mentoring experiences identified by the majority of the beginning teachers in the present study.

It should be mentioned that the *Satisfactory Teacher Dimensions* towards which the provisionally teacher works (see p. 48) have been replaced with the *Registered Teacher Criteria* with mandatory implementation in 2011 (New Zealand Teachers Council, 2009b). The *Criteria* provide no guidance as to ICT per se but merely mentions ‘technologies’ as assumed professional knowledge.

Since the original data collection for this study, a number of scholars have investigated the usefulness of online networks or communities to support beginning teachers (Brady & Schuck, 2005; Fulton, Yoon, & Lee, 2005; Gutke & Albion, 2008; Herrington, Herrington, Kervin, & Ferry, 2006; Romano, 2008). These studies concluded that while beginning teachers found the support from peers and ability to discuss issues of concern valuable, they preferred networks that included experienced teachers and other forms of support. In Australia, for example, the University of Wollongong has for some time operated a *Beginning and Establishing Successful Teachers* website (University of Wollongong, 2007). Here beginning teachers can interact with experienced mentors, access news and resources, collaborate to solve problems, reflect on teaching, document their teaching journey and maintain social contacts. Such developments for New Zealand beginning teachers may be beneficial. However, the key point is that merely establishing an online community of interest is not sufficient to support beginning teachers’ needs.

Recent Policy Developments and Research Reports on ICT

The *ICT Strategic Framework for Education* (Ministry of Education, 2006b)

underpins a number of recent developments. One such initiative is the ongoing *School Network Upgrade Project*, which subsidises and manages upgrades of data and electrical cabling in schools. To date 20% of those schools most in need have been upgraded to a level that provides stable school-wide Internet access (Ministry of Education, 2010, para. 8). This is of relevance to this study as issues of access were a problem experienced by a number of the participants, but so far, there is no evidence this development is supporting the work of beginning teachers.

The Ministry of Education's e-learning action plan for schools, *Enabling the 21st Century Learner* (Ministry of Education, 2006a) updated previous ICT strategies for schools. The action plan describes the government's goals for e-learning and the various projects and resources being developed to support these goals. The goals for schools ranged from effective teaching and teacher capability to principals' leadership in "promoting pedagogies that support the effective integration of ICT" (Ministry of Education, 2006a, p. 12). Many of these goals are in general agreement with the recommendations of this thesis. However, the inclusion of buzzwords of the day, for example 'personalising learning,' 'economic transformation' and 'lifelong learning,' creates a tension identified in the literature review and more recently discussed by scholars such as Selwyn (2008a; 2010) and Brown and Stratford (2007). This tension has its roots in the technocentricity inherent in a focus on technology, as discussed in the literature review, and what technology can do for multiple causes. This is not a new phenomenon, and as stated previously in this thesis, it remains important that graduating teachers be equipped with the strategic knowledge that allows them to deconstruct the policy rhetoric they will encounter in their work as teachers. Arguably, in light of recent policy developments, there is an even greater need for this type of critique.

A recent literature review of e-learning was commissioned by the Ministry of Education (Wright, 2010) and takes a critical approach to the evidence and conditions under which e-learning has the potential to improve student learning. The evidence and conditions are summarised in two main points: (1) a focus on specific ICT resources—rather than the teaching and learning processes—is more likely to be of greater benefit to students when combined with ‘good teaching’; and (2) “pedagogies which privilege collaboration, communication, sharing, problem-solving and risk-taking” may lead to greater student achievement (Wright, 2010, p. 39). A further point made is that the teacher is still central to creating optimum learning opportunities, where critical thinking and metacognition is combined with effective literacy practices. The findings strongly support the view that beginning, and indeed any, teaching is both complex and multifaceted, which this thesis underscores through the unique case studies of beginning teachers.

The Ministry of Education’s *ICT Professional Development Programmes* provide funding and resources to clusters of schools for a 3-year professional development programme in ICT. As at 2011, over 60% of New Zealand schools have participated in ICT professional development clusters according to the TKI website. Programme evaluation reports provide an insight into the potential for preservice teachers to experience the meaningful classroom use of ICT while on practicum, and the likely school context of support in ICT for beginning teachers, two issues of concern that were identified in the literature and confirmed by the findings of this research.

The most recent programme evaluation report is for the period 2006-2008 (Sahin & Ham, 2010). A notable aspect of this report was that 62% teachers said they had either never used ICT with their students before or had used ICT only a few times a year. After participating in the 3-year school-based ICT professional development programme, 77% of teachers reported that their students were using ICT routinely or on

a regular basis. However, student use of ICT was limited to word processing, problem solving through spreadsheets, finding information on the Internet, email and games or tutorials. Teachers' concerns at the conclusion of the programme were student ICT access, time constraints on keeping up with ICT developments, technical reliability and need for continued professional development, issues well rehearsed in the literature.

From this snapshot of teachers and students' use of ICT in schools since the data for this study were gathered, one can infer that preservice teachers on practicum and beginning teachers in their first teaching position today are still likely to experience varied school ICT contexts as reported in this thesis. Given the range of potential experiences, this thesis remains particularly timely and provides a framework for further research.

An Australian 3-year longitudinal study is a recent addition to the limited literature on beginning teachers' use of ICT (Bate, 2010). Bate's (Bate, 2010, p. 3) study of 35 Western Australian beginning teachers using a mixed-method approach sheds light on "the contested struggles that beginning teachers engaged in to implement ICT". In many respects, the study sought answers to questions similar to those asked in the present research, and to a large extent Bate's findings resonate with the findings of this study. For example, Bate's findings emphasise the impact of teacher beliefs and school culture on the participants' limited use of ICT and on their perceptions of its affordances and risks. Recommendations include that school leaders build a culture that values the use of ICT, remedy the structural constraints to beginning teachers' creative use of ICT, and enable beginning teachers to reflect on and clarify their pedagogical beliefs in relation to their use of ICT. A significant aspect of Bate's study is the presentation of a conceptual framework that allows the complex nature of teacher practice with ICT to be examined within the context of teachers' socio-cultural circumstances. This framework holds promise for future research in this area, especially

when informed by the present thesis and some of the new and emerging literature described in this chapter.

Recent Theoretical Developments in ICT

As identified in Chapter Six, the framework of *Technological, Pedagogical and Content Knowledge* (TPACK) is the theoretical development in ICT in education that has received the most attention, so renamed from the original Technological, Pedagogical, Content Knowledge (TPCK) (Thompson & Mishra, 2007). The framework is based on Shulman's construct of teacher knowledge (1986), where knowledge teachers need for effective teaching is categorised into content knowledge, pedagogical knowledge and pedagogical content knowledge. Mishra and Koehler (2006) argue that knowledge of ICT is often viewed as separate from these three kinds of knowledge, with ICT integration focusing on the technology itself. This was evident in reports by participants' in this study who had, indeed, taken a compulsory ICT skills course during their preservice teacher education. As beginning teachers, the technology itself was the focus for the majority of the participants when using ICT for teaching and learning.

The construct of TPACK developed when the affordances of ICT were considered in the context of Shulman's three categories of knowledge for teaching. Viewing 'integration' as an ill-defined process that lacks a theoretical base, the framework enables the dynamics in ICT integration to be clearly articulated. It emphasises the complexity in the relationship between and among content, pedagogy and technology. In a diagrammatic form, content, pedagogy and technology are shown as a cluster of three overlapping circles, the central overlapping intersection representing the integrative concept of TPACK.

The point of TPACK is that ICT use cannot be considered in isolation from content and pedagogy. This is in stark contrast to the requirements of the *Guidelines for*

the Approval of Preservice Teacher Education Programmes (New Zealand Teachers Council, 2009a), discussed earlier, which merely requires one of the TPACK strands, technological knowledge or TK to be considered: IT competency and its ‘pedagogical application.’ The *Guidelines* are clearly based on the belief that competency in IT will result in transferable skills which the beginning teacher can adapt and use in pedagogically meaningful ways in the classroom. The difference between the two conceptions of the ICT skills, knowledge and understandings new graduates need could not be greater.

A better understanding of the TPACK framework may help preservice teacher educators and their students to conceptualise more comprehensively which skills, knowledge and understandings beginning teachers need to be able to use ICT meaningfully in teaching and learning (Niess, Lee, & Kajder, 2008). However, this is not necessarily an easy task. Recent research has shed some light on the complexities in using the TPACK construct to prepare preservice teacher in ICT. Jaipal and Figg (2010), for example, investigated the characteristics of individual knowledge components necessary to use ICT for teaching and learning through a study of preservice teachers’ actual practise. Their findings showed that while all the domain of knowledge were important, preservice teachers’ technological pedagogical knowledge (TPK) was the most important to their successful planning and implementation of ICT-supported teaching and learning programmes. Jaipal and Figg’s research led to a framework, which expands on current understandings of TPACK and its components. It underscores the challenges for teacher educators in seeking to integrate ICT across domains of knowledge within preservice teacher education programmes.

Another study that used the TPACK construct examined Australian beginning teachers practice with ICT (Frank Bate, 2010). Bate found disparity between the beginning teachers’ espoused pedagogical beliefs and their actual use of ICT. The

beginning teachers faced a complex mix of constraints in using ICT in meaningful and innovative ways. At the individual level, it was apparent that the beginning teachers' technological, pedagogical and content knowledge did not operate as integrated constructs, even when the beginning teachers had a positive attitude to ICT and high levels of confidence in using ICT. This again suggests that the transfer of skills is problematic for beginning teachers.

Both of these qualitative studies were small and enabled a focus on the details of practice. In contrast, a large survey-based study of American online teachers (Archambault & Barnett, 2010) explored the validity and applicability of the TPACK framework. Archambault and Barnett found that exactly because the domains of knowledge in the TPACK framework are integrated into the construct itself, it was difficult to separate out and measure the teachers' individual domains of knowledge. They argue that while the TPACK construct in its current form is useful as a theoretical model, it has limited benefits for preservice and in-service teacher education.

The interest in the TPACK framework has resulted in a profusion of research activity that may yet see the framework adapted and expanded in ways that will make it more useful in teacher education in ICT.

Concluding Statement

In conclusion, five years on, the present thesis is still timely and relevant to the stakeholders in the field— preservice teacher educators, beginning teachers, mentors and school leaders, and policy makers. The timeliness and relevance are evident in the flawed logic of the New Zealand Teachers Council policy initiatives, particularly the technocentric conceptualisation of ICT in the new *Guidelines for the Approval of Preservice Teacher Education Programmes*. These directions, combined with the lack

POSTSCRIPT

of consensus over how best to prepare preservice teachers, suggest that the implications and recommendations of this thesis remain pertinent.

Recent developments in induction and mentoring policies for beginning teachers, mentors and school leaders are welcome and perhaps overdue. However, the complexity and multifaceted nature of ICT use by beginning teachers, together with the considerable variation in school culture and capacity in computer skills, indicate that the key messages for stakeholders regarding beginning teachers' needs are as relevant as ever.

While the TPACK theoretical framework is not a model for professional development, it does serve as *one* way of thinking about ICT and its relationship to teachers' knowledge of content and pedagogy. However, the lack of a robust theoretical construct for understanding how to best use ICT meaningfully in teaching and learning suggests that judgement about the practical application of TPACK is yet to be made.

This point returns the thesis full circle and highlights the large gap in the literature that remains. It is anticipated that further research in this area will do much to shed light on the type of support beginning teachers need to use ICT meaningfully. Above all, this study underscores the complexity in, and influence of, the school context on beginning teacher development. As Fullan observes:

In a non-linear, dynamic world, everything exists only in relationship to everything else, and the interaction between agents in the system leads to complex, unpredictable outcomes. (Fullan, 2001, p. 52)

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APPENDICES

APPENDICES

APPENDIX A	Literature Search Strategies
APPENDIX B	Satisfactory Teacher Dimensions
APPENDIX C	The Teachers Council's "Fit to be a Teacher" Criteria
APPENDIX D	Background Questionnaire
APPENDIX E	Massey University Human Ethics Committee Letter of Approval
APPENDIX F	Letter to Principals
APPENDIX G	Participant Information Sheet
APPENDIX H	Participant Consent Form
APPENDIX I	Student Information Sheet
APPENDIX J	Student Consent Form
APPENDIX K	Parent/Caregiver Information Sheet
APPENDIX L	Parent/Caregiver Consent Form
APPENDIX M	ICT Course Options in Participants' Preservice Programme
APPENDIX N	First Interview Schedule
APPENDIX O	Instruction for Classroom Photo Activity
APPENDIX P	Photo-Interview Schedule
APPENDIX Q	Sample Interview Transcript
APPENDIX R	Data Coding Example
APPENDIX S	Preservice ICT Competence Test

Appendix A: Literature Search Strategies

Search terms used in database searches, where DE denotes ‘descriptors’ and KW ‘keywords’:

DE: Beginning Teachers
 DE: Beginning Teacher Induction
 DE: Educational Technology
 DE: Elementary Education
 KW: Beginning teachers
 KW: ICT
 KW: Technology
 KW: Computer Assisted Instruction
 KW: Primary
 KW: Secondary

Search terms were used in various combinations with Boolean delimiters such as AND, NOT and OR as well as additional keywords, e.g. ‘primary’ and ‘secondary.’ A search of the foremost educational database, ERIC, was conducted first and the vastness of the beginning teacher literature was demonstrated:

DE “Beginning Teachers” = 4171 results

DE “Beginning Teacher Induction” = 1185 results

(DE “Beginning Teacher Induction”) and (DE “Mentors”) = 621 results

In contrast, the paucity of the research that exists on beginning teachers’ use of ICT internationally was clearly shown in these examples from ERIC:

((DE “Beginning Teachers”)) and (DE “Educational Technology”) = 29 results

((DE “Beginning Teachers”)) and (DE “Educational Technology”) and (DE “Elementary Education”) = 1

(KW: beginning + teachers) + (KW: educational + technology) = 38 (when a date range 1995-2004 was applied, results = 25)

The International ERIC database was also searched. The options, Australian Educational Index 1976–2004 and British Educational Index 1976–2004, were both included. The results were:

Australian Educational Index: Beginning Teachers AND ICT = 6 records

British Educational Index: Beginning Teachers AND ICT = 1 record

A search of the New Zealand database, *Index New Zealand* (INNZ), which indexes New Zealand education journals¹, was carried out using a combination of keywords. The results were:

¹ The journal, *Computers in New Zealand Schools*, was by far the most predominant source for results in INNZ.

APPENDICES

KW: "beginning teachers" = 23

KW: "beginning teachers" + ICT = 2²

KW: "beginning teachers" + technology = 2

KW: "beginning teachers" + "Computer assisted instruction" = 2

KW: "beginning teachers" + ICT + primary = 0

KW: "beginning teachers" + ICT + secondary = 0

² One of these studies was in fact my own journal article on pre-service teachers' use of ICT, adding weight to the argument, referred to earlier, that a confusion exists in the portrayal of the two distinct populations, pre-service and beginning teachers.

Appendix B: The Satisfactory Teacher Dimensions

These broad criteria were developed by the Teacher Registration Board after wide consultation with major education groups. They must form the basis for recommendation for full registration. Satisfactory performance in each of these dimensions is required. Learning centres may use these dimensions in a variety of ways to help them reflect the special character of their centre and the standards they expect from teachers.

Note: Normally a teacher must demonstrate satisfactory achievement of the dimensions through the medium of an official language of New Zealand (Maori or English) There will be some multicultural or language teaching situations where some of the dimensions will be demonstrated in other languages.

Professional knowledge

This is evident in the planning and preparation that goes into the teaching/learning programme and the willingness and commitment of the teacher to extend knowledge of content and theory throughout his or her career to provide quality programmes and activities.

A satisfactory teacher demonstrates knowledge of:

- current curricula*, the subjects being taught and current learning theory;
- the Treaty of Waitangi and te reo Maori me ona tikanga;
- the characteristics and progress of their students;
- appropriate teaching objectives;
- appropriate technology and resources; and
- appropriate learning activities, programmes and assessment.

(*In state schools this will be the New Zealand Curriculum requirements; in early childhood centres, Te Whariki and Desirable Objectives and Practices)

Professional practice

This is demonstrated by the environment for learning established and maintained by the teacher and the actual teaching processes used every day.

The Learning Environment

- A satisfactory teacher in practice:
- creates an environment of respect and understanding;
- establishes high expectations which value and promote learning;
- manages student learning processes;
- manages student behaviour positively, and
- establishes a safe physical and emotional environment.

Teaching

A satisfactory teacher in practice:

- communicates clearly and accurately in either or both of the official languages of NZ;
- uses a range of teaching approaches;
- engages students in learning;
- provides feedback to students and assesses learning, and
- demonstrates flexibility and responsiveness.

Professional relationships

These are demonstrated by the positive way in which the teacher sees his or her cooperative role in the learning centre, shares information with colleagues, families, whanau and caregivers, and respects the position of trust and confidentiality he or she has.

A satisfactory teacher in developing relationships:

- reflects on teaching with a view to improvement;
- maintains accurate records;
- communicates with families, whanau and caregivers;
- contributes to the life of the learning centre;
- develops professionally; and
- maintains confidentiality, trust and respect.

Professional leadership

All teachers display leadership in some aspects of their work. The context in which leadership is displayed will vary according to the position. A teacher with senior responsibilities will have developed all the dimensions of being a teacher to high levels and will be respected for his or her educational expertise and innovation.

A satisfactory teacher in showing leadership:

- demonstrates flexibility and adaptability;
- focuses on teaching and learning;
- leads and supports other teachers;
- displays ethical behaviour* and responsibility;
- recognises and supports diversity among groups and individuals;
- encourages others and participates in professional development, and
- manages resources safely and effectively.

(*Ethical behaviour may be determined by a specific code covering teachers in the learning centre)

Individual learning centres will establish their own specific standards to determine whether a teacher meets the above dimensions.

Appendix C: The Teachers Council’s “Fit to be a Teacher” Criteria

Those fit to teach possess a range of personal qualities which are listed below. For those entering teaching for the first time, the fitness for teaching should have been assessed during training. Because these qualities are outcome requirements for all approved teacher education programmes, it will be accepted that all who satisfactorily graduate have the required qualities. A statement about the applicant's fitness to be a teacher will be required from the learning centre where the applicant last taught. A statement will not be required if the applicant has been registered with this Council before and has not taught since the date of the last application.

A person who is 'fit to be a teacher' should have the personal qualities to operate in four domains: in the teaching/learning space (e.g. a classroom), in the learning centre (e.g. school, kohanga reo), in the community and in the teaching profession. In each domain a teacher will interact with learners (students), parents/whanau/caregivers, employer and colleagues, and should at all times maintain high standards of:

trustworthiness, to:

- work independently and without supervision;
- meet any reasonable requirement for the protection and safety of others;
- preserve confidences.

honesty, to:

- demonstrate integrity in all contacts;
- respect persons and property;
- report clearly and truthfully.

reliability, to:

- take on responsibilities with due regard for time and place;
- meet the expectations of caregivers and the learning centre when supervising learners;
- accept, plan and execute a variety of tasks and professional responsibilities.

sensitivity and compassion, to:

- respect other cultural and social values;
- recognise and respect others as individuals;
- care for the learning of those who are disadvantaged and those with learning difficulties;
- demonstrate firmness when necessary;

respect for others, to:

- demonstrate respect for the law
- adopt accepted codes of language, dress and demeanour;
- accept and carry out collegial and employer decisions;
- respect the views of others.

APPENDICES

imagination, enthusiasm and dedication, to:

- support and inspire others in their work;
- generate excitement and satisfaction in learning;
- engage in co-curricular tasks which expand learning opportunities;
- show respect for learning and inspire a love of learning.

communication, to:

- communicate easily and lucidly in the English or Maori official languages of New Zealand;
- exercise discretion;
- give and receive constructive criticism.
- seek advice when needed.

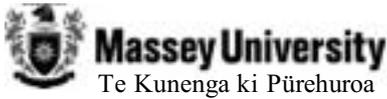
physical and mental health, to:

- carry out duties safely and satisfactorily;
- show emotional balance and maturity;
- display warmth and humour;

Notwithstanding the above qualities a person could be considered not fit to be (or continue to be) a teacher if evidence was provided that as a teacher he or she had behaved in a way that was seriously unethical, irresponsible or unprofessional. For example:

disobeying lawful and reasonable orders or instructions; being negligent, careless or indolent in carrying out duties; misusing or failing to take proper care of property or equipment in his or her custody or charge; being absent from duty without valid excuse; engaging in sexual activity with a student; sexually harassing, verbally abusing or assaulting colleagues, parents or students.

Appendix D: Background Questionnaire



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study of Beginning Teachers' Use of Information and Communication Technology (ICT) for Teaching and Learning

PARTICIPANT BACKGROUND SURVEY

I. Participant Information

Name

Name of School

Email Address

Class level you are teaching this year

Number of students in your class

II. Personal Data

Gender [] Female [] Male

Age Bracket [] 20-24 [] 25-29 [] 30-34 [] 35+

III. Your Educational Background

What was your last class level at school:

What is the highest degree or diploma you have attained?

What is the Subject Study Focus Area of your Teaching qualification?
.....

IV. Your Personal ICT Background

While at school, at what class level did you first have access, if at all, to a computer and the Internet? If you did not have access to a computer or the Internet, please write "0".

Computer at home: class level [] Internet access at home: class level []
Computer at school: class level [] Internet access at school: class level []

While at school, did you take classes in Text and Information Management (TIM), Information Technology or some other type of computer study? If so, please state which.
.....
.....

APPENDICES

- When did you first become reasonably comfortable with using computers? only one
1. While I was at high school or earlier []
 2. While working in a job prior to training as a teacher []
 2. While studying at the Dunedin College of Education []
 3. While working in a job outside the Dunedin College of Education []
 4. Other (describe) []
 5. I am still not “reasonably familiar and comfortable with using computers” []

Which of the following activities do you currently use a computer for and how often:
Circle one each line

	Daily	Most days	Weekly	Some weeks	Never
Email	●	●	●	●	●
Writing	●	●	●	●	●
Downloading music	●	●	●	●	●
Playing games	●	●	●	●	●
Searching the WWW	●	●	●	●	●
Other:	●	●	●	●	●

IV. Professional ICT Background

Did you take ICT as a subject study at the College of Education? [] Yes [] No
 If yes, how useful did you find the course? *Circle one.*

● ——— ● ——— ● ——— ● ——— ●

Poor Fair Useful Very useful Extremely useful

Did you have ICT as a specific focus in Technology? [] Yes [] No
 If yes, how useful was this module? *Circle one.*

● ——— ● ——— ● ——— ● ——— ●

Poor Fair Useful Very useful Extremely useful

What other opportunities did you have to learn about using ICT for teaching and learning at the Dunedin College of Education? For example, were you encouraged to use ICT and/or the Internet for your research and presentation of assignments?

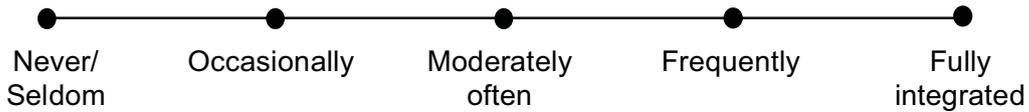
In what year of study were you first introduced to the potential of ICT in teaching?
 Year []
 Overall, how would you rate the extent of ICT modelling in the learning and teaching process you experienced from your lecturers? *Circle one.*

● ——— ● ——— ● ——— ● ——— ●

Never/ Seldom Moderate amount Quite often Frequently Fully integrated

APPENDICES

How would you rate the extent of ICT being used in classrooms during your school practicum placements? *Circle one.*

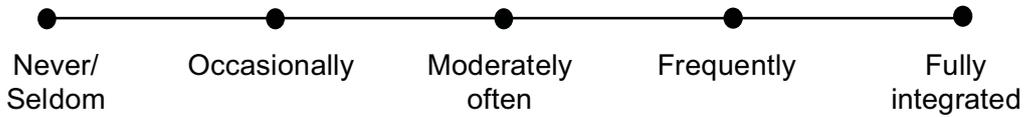


Do you have any comments to make about the level and extent of ICT being used in the classroom during your school practicum placements?

.....

.....

How would you rate the level of ICT use by your associate teacher in your final practicum?



Briefly, how did your associate teachers' use ICT professionally (e.g. for planning and report writing) and for teaching and learning?

.....

.....

Were you encouraged to incorporate ICT in your planning while on practicum?

Yes No If yes, how useful was this experience?

.....

.....

How would you rate the level of ICT you used with students while on your final practicum?



How would you rate your level of ICT use for professional purposes while on your final practicum?

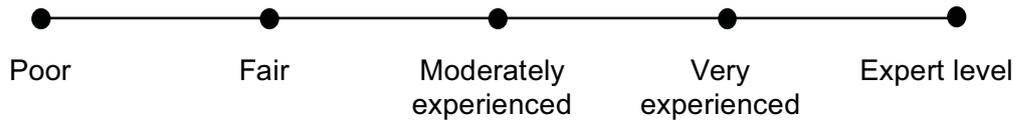


In summary, how would you rate your level of *technical skills and experience* with ICT on leaving College? *Circle one.*



APPENDICES

In summary, how would you rate your level of level of *pedagogical skills and experience* with ICT on leaving College? *Circle one*



What, if anything, regarding ICT would you have liked to learn more about while at College?

.....

.....

V. ICT Facilities Available to You and Your Class

ICT facilities available for your own use:

- 1. A computer for your use while at school? []
- 2. A laptop computer for using both at home and at work? []
- 3. Access to email and WWW in your classroom? []
- 4. Other (please specify)

ICT facilities available to your class:

- 1. Numbers of computers in the classroom? []
- 2. A printer in the classroom or nearby? []
- 3. Access to email for students? []
- 4. Access to WWW for students in the classroom? []
- 5. Access to WWW for students in the library? []
- 6. Access to library catalogue from the classroom []
- 7. Digital still camera? []
- 8. Video camera? []
- 9. Other (please specify)

Other facilities:

- 1. Does the school have an intranet? []
- 2. Does the school have a website? []
- 3. Does the school have broadband access? []
- 4. Other (please specify)

ICT facilities available at home:

Do you have a computer at home? [] Yes [] No

Do you have Internet access at home? [] Yes [] No

If yes, how often do you use it for professional purposes? *Circle one.*



Thank you very much for your time and consideration in completing this survey!

Appendix E: Massey University Human Ethics Committee

Letter of Approval



Massey University

18 March 2005

Anne Elliot
RD2
Middlemarch 9056
OTAGO

Dear Anne

Re: HEC: WGTN Application – 05/03: Beginning teachers use of information and communication technology (ICT) for teaching and learning

Thank you for your letter dated 18 March 2005.

On behalf of the Massey University Human Ethics Committee: Wellington I am pleased to advise you that the ethics of your application are approved. Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

A reminder to include the following statement on all public documents: *“This project has been reviewed and approved by the Massey University Human Ethics Committee, Wellington Application 05/03. If you have any concerns about the ethics of this research, please contact Professor Sylvia Rumball, Chair, Massey University Campus Human Ethics Committee: WGTN telephone 06 350 5249, email humanethicswn@massey.ac.nz”.*

Yours sincerely

A handwritten signature in blue ink that reads "Sylvia Rumball".

Professor Sylvia V Rumball, Chair
Massey University Campus Human Ethics Committee: Wellington

cc Mr Mark Brown
Department of Learning & Teaching, PN900

Dr John O’Neill
Graduate School of Education, PN900

OFFICE OF THE ASSISTANT
TO THE VICE-CHANCELLOR
(ETHICS & EQUITY)
Private Bag 11 222
Palmerston North
New Zealand
T 64 6 350 5573
F 64 6 350 5622
humanethics@massey.ac.nz
www.massey.ac.nz

Appendix F: Letter to Principals



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

[Date]

The Principal
School
Address
City

I am a doctoral degree candidate at Massey University's Graduate School of Education conducting a study of beginning teachers' use of information and communication technology (ICT). This is an area about which little is known, and it is anticipated that insights gained will be useful for teacher educators, tutor teachers responsible for school's advice and guidance programmes and to those involved in setting ICT policy.

You are receiving this letter because [*name of beginning teacher*] has expressed an interest in participating in this study. Prospective beginning teachers were invited to self-select possible participation during their last week at the Dunedin College of Education.

The study would require that I interview [*name of beginning teacher*] twice outside school time, preferably in [*name of beginning teacher*] classroom. The first interview would take place during Term 1 and the second during Term 3, and each would take 1-1½ hour. In addition, [*name of beginning teacher*] would be asked to photograph classroom activities that incorporate ICT during Term 2. The photographs will serve as points for discussion during the second interview. I will provide a 27-exposure disposable camera. However, if [*name of beginning teacher*] has access to a digital camera at these times, she may choose to use that.

Consent for the children in [*name of beginning teacher*]' class to be photographed would be required. I will provide the necessary information sheets and consent forms for parents/caregivers and for those children, who are able to give their own consent, usually when they are over 7 years old. These forms would need to be distributed and the signed consent forms returned before this phase commences. Airbrushing would be used to obscure those children for whom no consent is given should they feature in any photo. The photos will serve only as a point of discussion with [*name of beginning teacher*] and will not be published in any form.

The data gathered will be kept secure and available only to the researcher and the supervisors. At the conclusion of the study, all data in the form of audiotapes, transcripts, photographs and consent forms will be stored securely at the researcher's residence for 5 years after which the Massey University School of Graduate Research will destroy them.

APPENDICES

A summary of the research findings will be made available to you at the conclusion of the study.

The name of the school and that of [*name of beginning teacher*] as well as those of children will not be used in the study. Pseudonyms will be used throughout to preserve confidentiality. I have attached the participant's Information Sheet, which outlines the research in more detail and further explains the research objective.

The quality of the research is dependent on the cooperation of schools to participate and I trust that you will see the value of such research to the wider teaching profession.

Thank you for your consideration of this matter and I hope you and the Board of Trustees will agree to the participation of [*name of beginning teacher*] in this research study. I will phone you in a few days time to see if you have any questions, and you are very welcome to contact my supervisors or myself by phone or by email.

Yours sincerely,

Edd Candidate
Massey University Graduate School of Education

PROJECT CONTACTS

Researcher
Anne Elliot
[*Address removed from original*]

Supervisors

Dr. Mark E. Brown (Chief Supervisor)
Department of Learning and Teaching
Massey University College of Education
Private Bag 11 222
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Dr. John O'Neill (Second Supervisor)
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Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee, Wellington Application 05/03. If you have any concerns about the ethics of this research, please contact Professor Sylvia Rumball, Chair, Massey University Campus Human Ethics Committee: WGTN telephone 06 350 5249, email humanethicswn@massey.ac.nz.

Appendix G: Participant Information Sheet



Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study of Beginning Teachers' Use of Information and Communication Technology (ICT) for Teaching and Learning

PARTICIPANT INFORMATION SHEET

Introduction

You are invited to participate in a research study that I am undertaking for an Educational Doctorate degree at Massey University. The purpose of this research is to investigate beginning primary teachers' use of information and communication technology (ICT) in their first year of teaching, and from their experiences to gain an understanding of the factors that promote or constrain their pedagogical effectiveness in this area. This is an area about which little is known, and it is expected that insights gained will be useful to teacher educators, to tutor teachers responsible for school's advice and guidance programmes and to those involved in setting ICT policy.

Participant Recruitment

In late 2004, with approval from the Dunedin College of Education, prospective beginning teachers were invited to self-nominate possible participation in the study. You are receiving this letter because you expressed an interest in participating.

Participants for this study will be selected primarily on the basis of having a full time teaching appointment for 2005. The total number of participants sought is six. This number has been chosen to enable an in-depth study of the participants' experiences. Should more than this number meet the criterion, a selection will be made on the basis of whether participants have taken subject courses in ICT during their preservice education, gender, geographical location, and whether their teaching position is in a city or rural school.

Your involvement

There are three aspects to the research: (1) A questionnaire and an interview; (2) Participants taking photos of activities in their classroom when ICT is used for teaching and learning; and (3) A follow up photo interview.

1. During Term 1, 2005, your involvement will be a meeting after school in your classroom, if possible, where I will first ask you to fill out a background survey. The survey will provide information about your previous experiences with ICT and should take no more than 15 min to complete. Second, I will then interview you about your experiences with ICT so far. This will take about 1-1½ hour. The interview will be audiotaped with your written consent.
2. During Term 2, 2005, I will ask you to photograph classroom activities that incorporate ICT. You may also choose to hand over the camera to the children if you are involved in the activity to be recorded yourself. I will give you a 27-exposure disposable camera and an addressed and stamped envelope to return the completed films to me for development. If you have a digital camera available at these times, you may choose to use that.

Consent will be required to photograph the children in your class. This involves providing the children's parents/caregivers with an information sheet that explains the process and a consent form to be signed. Where children are able to give their own consent, usually when they are over 7 years old, their consent will also be sought. I will provide the necessary forms to be distributed and ask that you to collect these before this phase commences. I will ask you to identify those students who have not given consent, and if they feature in any photo, they will be obscured by airbrushing. The photographs will serve as a point of discussion only and will not be published.

3. During Term 3, 2005, I will interview you again using the photographs you have taken as a starting point. The interview will take about 1-1½ hour. This interview will also be audiotaped with your written consent.

Project Procedures

The audiotaped interviews will be transcribed. I will send you these to read and amend if they does not reflect what you intended. An 'Authority for the Release of Tape Transcript' will be included. The transcribed interview will be analysed and selected statements included in the final report to illustrate relevant points.

The audiotapes, transcripts and photographs will be kept secure and made available only to the researcher and the supervisors for the purpose of this project.

At the conclusion of the study, audiotapes, transcripts, photographs and consent forms will be stored securely in a locked facility for 5 years at the researcher's residence after which they will be destroyed by the Massey University School of Graduate Research.

A summary of the research findings will be made available to you at the conclusion of the study.

Your name and that of the schools as well as those of children will not be used in the study. To preserve the confidentiality of your identity you will be invited to select a pseudonym for yourself and your school.

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study at any time;
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used;
- be given access to a summary of the project findings when it is concluded.
- to ask for the audiotape to be turned off at any time during the interview.

Support Processes

If you feel uncomfortable about answering any of the questions, feel free to express your concern. If you remain discomforted, which is most unlikely, I will identify with you an appropriate source of support to talk through any issues that emerge from the research.

Project Contacts

You are welcome to discuss any concerns regarding the study with the researcher or supervisors at any time.

Researcher

Anne Elliot
[Address removed from original]

Supervisors

Dr. Mark E. Brown (Chief Supervisor)	Dr. John O'Neill (Second Supervisor)
Department of Learning and Teaching	Graduate School of Education
Massey University College of Education	Massey University College of Education
Private Bag 11 222	Private Bag 11 222
Palmerston North	Palmerston North
Phone: 06 356 9099, ext 8626	Phone: 06 356 9099, ext 8264
Email: M.E.Brown@massey.ac.nz	Email: J.G.ONeill@massey.ac.nz

Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee, Wellington Application 05/03. If you have any concerns about the ethics of this research, please contact Professor Sylvia Rumball, Chair, Massey University Campus Human Ethics Committee: WGTN telephone 06 350 5249, email humanethicswn@massey.ac.nz.

Appendix H: Participant Consent Form



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

**A Study of Beginning Teachers' Use of Information and
Communication Technology (ICT)
for Teaching and Learning**

PARTICIPANT CONSENT FORM

This consent form will be held for a period of five (5) years

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being audio taped. (Please delete one.)

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: _____ **Date:** _____

Full Name printed

Appendix I: Student Information Sheet



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study About Using Computers in the Classroom

STUDENT INFORMATION SHEET

I would like to invite you to take part in this study. If you have any questions please do not hesitate to ask.

In this study I would like to know how you and the other children in your class use computers to learn. Your teacher will take some photographs when the children use computers. I will look at the photographs when I talk to your teacher about what you did. The photographs will help your teacher remember.

The photographs will not be used in any other way or seen by anybody else except the people from the university who are helping me with my studies.

Your parents will also be asked to give their permission for you to take part in this study. Please talk this over with your parents before you decide whether or not to participate.

You do not have to be in this study if you do not want to. If you decide to participate in the study, you can stop at any time.

If you have any questions at any time, please ask your teacher or your parents.

Anne Elliot

This project is for my study at Massey University.

APPENDICES

Researcher

Anne Elliot

[Address removed from original]

Supervisors

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Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee, Wellington Application 05/03. If you have any concerns about the ethics of this research, please contact Professor Sylvia Rumball, Chair, Massey University Campus Human Ethics Committee: WGTN telephone 06 350 5249, email humanethicswn@massey.ac.nz.

Appendix J: Student Consent Form



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study About Using Computers in the Classroom

STUDENT CONSENT FORM

This consent form will be held for a period of five (5) years

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered, and I understand that I may ask further questions at any time.

I agree/do not agree to participate in this research study as explained in the Information Sheet. (*Please delete one.*)

Signature: **Date:**

My Name printed

Please return this form to your teacher.

Thank you for agreeing to participate in this study.

Appendix K: Parent/Caregiver Information Sheet



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study of Beginning Teachers' Use of Information and Communication Technology (ICT) for Teaching and Learning

PARENT/CAREGIVER INFORMATION SHEET

You are invited to permit your child to participate in this research study by appearing in classroom photographs. The following information is provided in order to help you to make an informed decision whether or not to allow your child to participate. If you have any questions please do not hesitate to ask.

The purpose of this study is to investigate the use of information and communication technology (ICT/computers) by beginning teachers. To gain information about ICT use in the classroom, your child's teacher will take photographs of the children when they use ICT in their learning programmes. These photographs will then be used as a discussion point during one interview with the teacher outside class time.

The photographs are intended only as a point of reference during the interview for your child's teacher to better remember instances where ICT was used in the classroom. The photographs will not be used in any publication or viewed by anybody other than the teacher, the researcher and the university supervisors. Nor will the photographs be used for any assessment of your child's learning.

There are no known risks associated with this research.

The information obtained from this study may help us to better understand how and why ICT is used, and how new teachers can get the most out of using ICT in their classroom.

The information obtained from the interviews in this study may be published in educational journals or presented at educational meetings, but no photograph will be used and your child's identity will be kept strictly confidential.

At the conclusion of the study, the photographs will be kept as records for a period of 5 years in a secure place after which they will be destroyed.

You are free to decide not to let your child participate in this study or to withdraw your child at any time without adversely affecting their or your relationship with the teacher.

APPENDICES

Project Contacts

You are welcome to discuss any concerns regarding the study with the researcher or supervisors at any time.

Researcher

Anne Elliot

[Address removed from original]

This research is undertaken for an Educational Doctorate degree at Massey University.

Supervisors

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Department of Learning and Teaching
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Committee Approval Statement

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Appendix L: Parent/Caregiver Consent Form



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

A Study of Beginning Teachers' Use of Information and Communication Technology (ICT) for Teaching and Learning

PARENT/CAREGIVER CONSENT FORM

This consent form will be held for a period of five (5) years

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree for my child to participate in this study under the conditions set out in the Information Sheet. *(Please circle one)*

Child's Name:

My Signature:

Date:

Full Name printed:

Please return this form to your child's teacher.

Thank you for considering your child's participation in this study.

Appendix M: ICT Course Options in Participants' Preservice Programme

ICT papers available in participants' preservice programme

Two papers in ICT were available as electives to all the participants irrespective of their particular Bachelor of Education. They were:

Paper One Computer Technology. This course will provide students with the computer technology skills and understanding necessary for file management and use of common computer applications. No ICT prerequisites.

Paper Two Educational Computing. The course examines the purposeful integration of computers into the curriculum. Students will explore the curriculum statements and other relevant Ministry of Education documents in relation to the use of computers. They will look at the underlying philosophy required for use of computers as tools for teaching and learning, and examine practical ways of incorporating the computers into the classroom. No ICT prerequisites.

Paper One was a year one option in year one and in two of the Bachelor of Education programme. Paper Two was an option in the final year of study.

Appendix N: First interview schedule

Interview Schedule for Semi-Structured Interview

Items in bullet points indicate possible probes

Please tell me what you see as the place and purpose of ICT in schools.

- Purpose - why use? What can be achieved?
- Familiarity with ICT Strategy
- Where does the impetus for ICT come from?
- Technology curriculum

Please describe the expectations of you in regard to ICT in your school.

- School policy
- Importance placed on ICT – Is ICT a school focus? Cluster?
- Staff development
- Laptop for Teachers – Are you or other staff considered?
- Use by staff

Tell me about what ICT access is available in your classroom and in your school.

- Types of programmes available
- Peripherals, e.g. printer, CD-ROM R-W, digital camera, scanner
- Internet access
- Email accounts
- Library
- Ergonomically suitable tables, chairs, power points

Please tell me how you feel about using ICT in your classroom programmes at this point in your teaching.

- Anxiety, feeling isolated or excitement?
- Putting it off?

APPENDICES

What support is available to you in using ICT in your classroom?

- Tutor teacher
- Helpful colleagues
- Technical help
- Opportunity to observe others
- Opportunities to participate in in-service courses

Tell me about the children's interest in and ability with ICT.

- How have the children responded, so far, to your planned or unplanned use of ICT?

Do you know how many of the children in your class have computer access at home?

- Internet access
- Email address
- Do you consider disparity in access a problem ('digital divide')?

What aspect of your preservice education do you think is promoting your effective use of ICT?

- Are there areas where you wish you had had the opportunity to learn more?
- How do you feel about using ICT in the coming Term?

Appendix O: Instruction for Classroom Photo Activity



Graduate School of Education
Massey University College of Education
Massey University
Private Bag 11222
Palmerston North

The Photography Process

The photography process serves the purpose of gathering examples of teaching and learning activities where ICT is used. The photographs will then be used during the second interview as a focus for our conversation.

The disposable camera has 27 exposures and so can be used indoors. There is also a CD into the postbag if you have a digital camera available. You are welcome to use either or combine both media.

At the end of term 2, please return the disposable camera and/or CD to me in the addressed and stamped postbag, so the photos can be developed/printed.

It is necessary to obtain consent for children in your class to be photographed. This involves providing the children's parents/caregivers with an information sheet that explains the process and a consent form to be signed and returned (they keep the information sheet). Where children are able to give their own consent, usually when they are over 7 years old, their consent should also be sought. I have attached the following:

- An information sheet for parents/caregivers.
- A consent form for parents/caregivers.
- An information sheet for children.
- A consent form for children.

Please distribute the information sheets and consent forms to parents/caregivers so they can be returned in advance of commencing the recording of the activities. Please compile a list of those children who do not have/give consent as they will need to be obscured for our discussion where their faces feature in a photograph.

You may choose to pass the camera to children when you are involved in the activity. I think you will enjoy this phase and hope you will use it as an excuse to have fun. This is not intended to be a formal recording for evaluation but the day-to-day real activities.

Do not hesitate to contact me if you have any questions or concerns.

Kind regards

Anne Elliot
Researcher

[Address removed from original]

Appendix P: Photo Interview Schedule

Semi-structured photo interview schedule

Focus Questions: How do beginning teachers use ICT for teaching and learning in their classroom? What issues do they face?

Evaluation of the first two terms of teaching: Experiences with ICT so far

- Tell me about what you have been doing with the class in relation to ICT.
- What went well – why?
- What did not so go well – why?
- What did/would you change? Strategies?
- Were these experiences what you expected? How were they different?
- Were you encouraged to try new things? Or felt overwhelmed and challenged?
- What do you need now?

Pedagogical issues

- Were learning opportunities with ICT authentic?
- Were the children responsive to your planned or unplanned use of ICT?
- What did children learn? How do you know?
- What would you (need to) change to better match the activities with the desired learning outcomes?

Support – formal and informal

- Did you feel you received adequate support from your tutor teacher?
- Were colleagues helpful?
- Did you have access to timely technical help?
- Were you confused about advice that did not fit with your philosophy of teaching and learning? What did you then do?

Resilience - Personal skills

- What steps have you taken to overcome problems you have faced?
- What skills do you believe you have that enabled you to cope?
- What strategies did you use?
- What factors were outside your control or influence?
- What were the biggest issues?

Perceptions of value of ICT

- In your opinion, how do you see the value of ICT in terms of student learning from your experiences?

APPENDICES

- What would it take to change

Preservice preparation

- What aspects of your preparation do you believe was effective in equipping you to use ICT for teaching and learning?
- What aspects do you believe could have been better addressed?

Appendix Q: Sample Interview Transcript

Sample interview transcript

Arnold: Hopefully, I am developing my skills as we go, too, and I am learning from the kids [laughter] as well and also support from my tutor teacher with technology, because she's very able in technology and helps me with that. But, yeah, in ways to teach it, I think I will be more confident, whereas this year I haven't been one hundred percent sure what I was doing.

Anne: But you have done a lot with having been a reluctant beginner at your teacher education institution.

Arnold: Yes. [Laughter]

Anne: What do you need to know next?

Arnold: Uh. [Silence] What do I need to know next? [Thinking]

Anne: Obviously MovieMaker for the next project. But generally, looking further ahead, for example, do students use the computer as they go during the day and the week? Is it switched on most times?

Arnold: Oh yes, the computer is always switched on. No, they don't really use it compared to, say, the experienced teacher here. Every time I walk in, there seem to always be two or three people on it.

Anne: What do you think they are doing?

Arnold: Well, they have educational games that they seem to be using most of the time. But there's always a lot of publishing, like, there's one boy doing a speech at the moment, who found it easier to type it. And this boy is a huge behaviour problem.

Anne: Often one hears about the integration of ICT. In your view, what does that mean?

Arnold: Just giving in each planned unit the opportunity for ICT to be used in all the curriculum areas.

Anne: How do you do that with one or two computers and 26 kids and one hour a week in the computer lab? How would that work? What are the limitations?

Arnold: [Laughter] I don't know how we get around it. It's just...

Anne: Do you sometimes feel quite isolated regarding ICT or are you quite happy to front up and say, "Look, I actually have no idea how this might work that we have talked about"?

Arnold: No, I'm happy to say that because it's quite a lot. [Laughter]

Anne: How do you feel about using ICT in this term now?

Arnold: It's getting better. Like I said, I can ask the children now if I'm not sure, 'cause they'll know something and then help me and then I can, sort of, teach the others.

Anne: Is your personal view that ICT has a place in schools at all?

Arnold: Oh, for sure. Especially, like I said before, with the workplace, there are more and more computers in the workplace, and they definitely need them in schools, yes, to cater for everyone's needs—not just those that have computers at home. It helps those that don't.

Appendix R: Data Coding Example

<p>perception of school's expectations in ICT</p> <p>frequency of use</p> <p>computer lab facilities</p>	<p>Anne: First, please describe the expectations of you in regard to ICT here at this school.</p> <p>Annabel: They expect me to teach it to the children every week. We have a computer time that we can go to the computer time and they have got, you know, a screen thing... what's it called?</p> <p>Anne: A data projector?</p> <p>Annabel: Yes, so we can have a big screen so the children can all follow what we are doing on the computer</p>
<p>Beliefs school's curriculum planning</p> <p>perception of school's expectations</p>	<p>Anne: Ah, so are you required to teach according to a teaching plan?</p> <p>Annabel: Yes, they give us the learning outcomes we are expected to teach with a final outcome, for example, like a mind map of a fairy tale or something that we have produce at the end of it and then we just teach them what we want during that.</p>
<p>school's curriculum planning</p> <p>beliefs about school policy</p>	<p>Anne: Do you integrate what you teach them there with your general classroom programme, topics, and so on?</p> <p>Annabel: Yes, all the school—everything is integrated, so we all do one big plan together and we all teach from that. So, everything is fairy tale based this term.</p>
<p>knowledge of school policy</p>	<p>Anne: Does the school then have a policy on ICT?</p> <p>Annabel: I don't know. [Laughter] Yes, I would say it would but I don't know what it is.</p>
<p>belief about school's ICT policy</p> <p>beliefs about students' home use</p>	<p>Anne: How would you explain the importance that the school is placing on ICT?</p> <p>Annabel: Well, they must find it quite important, because they have a computer, like, lab that can fit every child on a computer, and most children have them at home, so they all know how to use them anyway. So it's quite important that they are kept...being taught information...</p>
<p>perception of staff ICT knowledge</p>	<p>Anne: How would you describe staff ICT knowledge?</p> <p>Annabel: Pretty good. Most teachers here seem to be using a computer. Yes, it's good.</p>

Appendix S: Preservice ICT Competence Test

Computing Competence Assessment

During your teacher education programme, you will be required to use computers for a variety of purposes. In order to provide appropriate computer support for those who need it we require information about your level of competence. To assist us with this please do as much as you can of the following tasks.

Task One

On the first line put your name and the college programme you are enrolled in. Save your work.

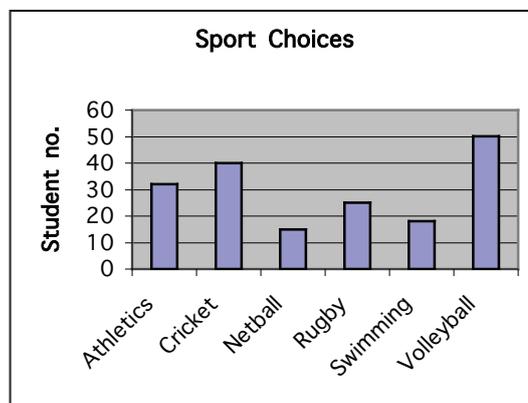
Write two or more short paragraphs. In the first paragraph, make an overall statement about your experience with computers including any relevant qualifications you may have. Also, mention if you have a computer for personal use and which computer platforms eg PC and/or Macintosh, you are familiar with.

In the second paragraph describe specific competencies you have, for instance in Word Processing, Spreadsheets, use of multi media, internet, e-mail etc.

Task Two

Reproduce the following examples using text boxes, tables, drawing tools and a spreadsheet.

Text boxes are very useful as they assist with organizing material in a variety of ways.



Name	Address	Phone Number	E-mail Address

Task Three

Fit it all onto one page if possible. Make sure it is saved as instructed. Print a copy to hand in. (Printing will not be in colour).