

Any bodies out there? Educating the posthuman.

A thesis submitted in fulfilment of the requirements
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Yoshi Budd
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Declaration of originality

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Ethical clearance for this project was gained from the University of Tasmania's Human Research Ethics Committee (Tasmania) Network. The schools, the teachers and the students are anonymous.

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Abstract

This study investigates the relationship between literacy, information and communication technologies (ICT), and pedagogy. As literacy and ICT are currently promoted as key elements of educational reform (Knobel & Lankshear, 1997; O'Rourke, 2003) this research examines the effects of new literacies, which are developing around digital technologies (Lankshear & Knobel, 1998), on pre-service teachers' pedagogies. The research acknowledges the cultural and political context in which new technologies are embedded (Wajcman, 1991), and theorises the epistemological and ontological implications of new patterns of practice, purpose and production in education (Lankshear, Peters & Knobel, 2000).

The thesis is informed by feminist, poststructuralist and posthuman theories, which problematise the presumed neutrality of language and technology, and provide a new lens through which issues of agency, identity, access and equity in education can be examined. A qualitative, combined methods approach, incorporating constructivist grounded theory (Charmaz 2000, 2006) and Foucauldian discourse analysis (Carabine, 2001; Foucault, 1972), examines how knowledge about new technologies for teaching and learning is produced and to what effect. Analysis focuses predominantly on pre-service teachers' discussions of their experiences with computers in the classroom and their reflections on an ICT case study.

The findings discuss the relationship between literacy, technology and pedagogy in terms of the ways in which ICT literacies in education establish new networks of power, which undermine pre-service teachers' efforts to develop critical and inclusive pedagogies. The thesis argues that new language practices around computer use signify epistemic shifts (Kress, 2000) that redefine concepts such as human potential and progress through a rewriting of the boundaries between bodies and technologies. Accordingly, the findings provide an account of the complex and contradictory teaching identities constructed at the nexus of contesting knowledge frameworks, as pre-service teachers find themselves accountable for the discrepancies between the ideals and realities of ICT in education.

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Chapter one

Introduction: Technologising literacy

1.1 Introduction

Technologizing literacy is not a simple, straightforward matter of bringing the new technologies to bear on literacy pedagogy, as the latest development in the inexorable advance of human reason and the disinterested pursuit of knowledge. Rather, it involves bringing together two complex and contradictory discursive fields, each of which is thoroughly imbricated in the maintenance and renewal of social power and the structured forms of privilege and subordination which characterize our society. (Bigum & Green, 1992, p. 24)

This research examines pre-service teachers' understandings of the role of information and communication technologies (ICT) in education through an analysis of their written reflections on a classroom based ICT case study (Garthwait & Weller, 2005). ICTs are powerful tools, not only for accessing, producing and disseminating texts, but also for organising and controlling how knowledge is communicated, and which knowledges are worth communicating (Snyder, 1997). For this reason, teachers and teacher educators are under increasing pressure not only to technologise teaching and learning activities, as authorised forms of literacy practice (Bigum & Green, 1992; Snyder, 2001a, 2001b), but also to develop a high level of proficiency in the new information and communications technologies that have become a part of home and work environments. For teachers, the complexity of integrating ICT into classroom practice is compounded with a fast capitalist mindset (Lankshear, 1997) that demands constant and rapid innovation and change and associates newness and increased productivity with progress (Postman, 1992). As a result teachers and educationalists are increasingly informed by, and dependant upon, the language of technicians and representatives from the ICT industry for determining which of the latest technologies are appropriate for their teaching programs and for understanding how such technologies can be put to best use.

1.2 Chapter overview

This chapter discusses the significance of a research question that asks how pre-service teachers understand the role of ICT in education, and also provides an overview of the thesis. The research question is examined not only in relation to research trends in

educational computing, but also in relation to the contradictory politics of contemporary literacy debates that undermine pre-service teachers' attempts to develop critical pedagogies for the purpose of interrogating the knowledge frameworks within which, both education and ICT are valued and understood. This chapter begins with a discussion of the aims and purposes of the research within the broader social context of predominant research approaches to ICT in education, and contemporary literacy debates. An overview and explanation of the researcher's theoretical position is then provided to position the research within feminist poststructuralist theories (Lee, 1992; Weedon, 1987), which foreground the need to know how knowledge is produced and to whose advantage. The issue of voice is discussed next, and the writing of feminist poststructuralist research is problematised in terms of the unavoidable political effects of textual practices that construct the researcher and the research participants as fixed and knowable subjects.

An overview of the thesis is then provided. Section 1.6 begins with a discussion of the literature review chapter, which presents a genealogical perspective (Carabine, 2001; Foucault, 1972, 1984a) on the construction of bodies requiring technological and pedagogical intervention. This section also provides a critical reading of the meaning making practices that inform the relationship between language, pedagogy and ICT in the information age. This is followed by a discussion of the research design in terms of the methodological principles that inform the researcher's approach to data collection and analysis. Finally, an explanation of the significance of the findings in the micro-context, that is, in terms of the epistemic practices of a group of pre-service teachers, is provided.

1.3 Research aims and purposes

This research aims to explicate the knowledge frameworks that pre-service teachers' draw from when discussing the role of ICT in education. This is undertaken for the purpose of challenging regimes of truth (Foucault, 1972) that enable pre-service teachers to discuss pedagogical issues in non-problematic ways. Participation in ostensibly natural and neutral language practices contributes to the entrenchment of homogenising systems that limit the range of pedagogical discourses and subject positions that are available to, and can be legitimately taken up by, teachers and students (Luke & Gore, 1992). Pre-service teachers, although already immersed in the culture of schooling, have yet to establish their classroom practices and pedagogical understandings from a teaching perspective. For this

reason, pre-service teachers are identified as an important opportunity for educational reform (Lewis, 1999).

This research also aims to contribute to feminist poststructuralist research in education by addressing the limitations of the predominantly positivist research frameworks applied to the field of educational computing, for bringing restrictive and alienating conditions to light (Zuga, 2007). This study draws from feminist theories (Butler, 1990; Grosz, 1994, 1999, 2005), poststructuralist theory (Foucault, 1972, 1978, 1980), posthuman theory (Hayles, 1996, 1999a, 1999b, 2006) and critical pedagogies (Lankshear, 1997, 2006; Lankshear & Knobel, 2005; Lankshear & Lawler, 1987; Lankshear, Peters & Knobel, 2000; McWilliam & Taylor, 1998) in order to construct a new lens through which the significance of an increasingly ICT oriented curriculum (Bigum & Green, 1992) can be examined.

This study takes up a feminist poststructuralist research orientation (Lee, 1992) and asks different kinds of questions (Snyder, 1999) in order to work with, rather than against, social complexity, and to identify the tensions, gaps and silences (Lee, 1992) in pre-service teachers' discussions of ICT in education. While research into ICT in education continues to be dominated by positivist research paradigms (Orlikowski & Baroudi, 1991; Richardson, Tapia & Kvasny, 2006) the social and political consequences of ICT in education remain undefined, unexamined and, therefore, uncontested. Lee (1992) voices her concern that "poststructuralist theories and investigative methodologies are almost completely ignored in 'Education'" (p. 1) with the result that some subject positions are made invisible or subjugated within positivist knowledge frameworks. Such frameworks aim to reduce social complexity by separating that which is known, from the broader language practices that determine what is knowable or worth knowing (Lee, 1992). Taking a broader perspective on the issues surrounding the role and place of new technologies within education makes visible the complex social and cultural effects of contesting worldviews (Knobel & Lankshear, 1997; Snyder, 1999) as they are constructed at the intersection of ICT and educational discourses within the context of this research.

Critical pedagogies acknowledge the "moral and political dimensions of education, drawing particular attention to the link between marginalisation in pedagogical work and minoritarian issues as a broader social politics" (McWilliam & Taylor, 1998, p. 29). The

current predominance of positivist, quantitative, descriptive research approaches to ICT in education informs a limited range of issues (Petrina, 1998). They do not engage with the various ways in which ICT practices across the curriculum might sustain and reproduce unfair systems (Snyder, 1999), nor do they promote the development of critical pedagogies that engage with “the totality of classroom events as cultural and social productions” (McWilliam & Taylor, 1998, p. 29). Feminist poststructuralist research in education supports the development of critical pedagogies by facilitating further examination of the links between the individual and the social “through a focus on the centrality of language in the organization of human experience” (Lee, 1992, para. 1). Weedon (1987) explains:

Language is the place where actual and possible forms of social organisation and their likely social and political consequences are defined and contested. Yet it is also the place where our sense of ourselves, our subjectivity, is constructed ... Subjectivity is produced in a whole range of discursive practices – economic, social, and political – the meanings of which are a constant site of struggle over power. (p. 21)

By investigating the relationship between language and technology, this research aims to extend and enhance understandings of the ways in which the use of new technologies in the classroom influences and shapes not only literacy practices (Snyder, 1999) but also social relationships and pre-service teachers’ pedagogies.

1.3.1 Literacy and ICT

The term computer literacy provides one example of a blurring of the boundaries between the language of the computer industry and education in terms of the different goals and values their discourses promote. This means that, while ICT specialists in education and critical pedagogues can both claim to be informed by social constructivist theories of education and utilise the same key words such as interactivity, literacy and creativity, they can nevertheless mean very different things and expect very different educational outcomes as a result of the contesting knowledge frameworks within which these terms are used and understood (Lankshear, 1997).

Increasingly, qualitative research approaches, informed by critical theories, are investigating the ways in which ICT in education makes the impact of “differential socialization and enculturation experiences” (Snyder, 1999, p. 5) more severe for some

groups of students. Since the early 1990's, there has been a growing recognition of the need for different research orientations towards understanding the socio-cultural effects of ICT in education. Socio-cultural (Lankshear, 1997) and feminist (Flores, 1990; Gerrard, 1999; Romano, 1993; Selfe, 1990) orientations to ICT research are now asking different types of questions, influencing the choice of research methods (Snyder, 1999) and shifting researchers' focus to issues of equity and access (Selfe, 1999).

During this time, there has also been greater research focus in the field of literacy and ICT (Lankshear et al., 1997; Selfe, 1999). As contemporary classroom practices are characterised by rapidly changing, technological interventions, pedagogical frameworks constructed at the intersection of ICT and literacy remain not only incomplete, but also highly problematic (Snyder, 1999). Many studies emphasise multiple ways of being literate (Green, 2006) and the expansion of definitions of literacy to include such examples as linguistic literacy, artistic/visual literacy, musical literacy, information literacy, emotional literacy, technological literacy, media literacy, multicultural literacy, critical literacy, recognition literacy, reproduction literacy, and reflection literacy (Elmborg, 2006) has caused considerable confusion. Literacy is often conceptualised as a set of mechanical skills, and particular literacies are linked to discrete learning areas. The fragmentation of the field of literacy makes it difficult to see the broader socio-political implications or the theoretical inconsistencies of particular language practices, and minimalises resistance to a production line mentality towards education, whereby the effectiveness of educational processes is determined by the ability to produce literate citizens as standardised and interchangeable commodities.

1.3.2 Literacy and intelligence

It is important to distinguish between the concept of multiliteracies (Cope & Kalantzis, 2000; Lankshear, Snyder & Green, 2000) and Gardner's (1993) concept of multiple intelligences at this point, as both terms are used in this thesis to represent "incommensurable" (Lyotard, 1984) epistemological frameworks for teaching and learning. From a poststructuralist perspective, use of the term literacy emphasises the importance of cultural context and language practices in privileging particular "values, goals, beliefs, assumptions, ideals, traditions, interests, institutional procedures, patterned power relations" (Lankshear & Lawler, 1987, p. 58) over others, thereby informing the development of teaching and learning subjectivities (Foucault, 1972). In contrast,

intelligence is a term that conceals social, cultural and political histories of advantage and disadvantage by referring to biological, natural and, therefore, apolitical cause and effect relationships.

Poststructuralist research questions concern “the complex ways in which individual human subjects come to understand themselves and the world in specific locations” (Lee, 1992, para. 1). This research, therefore, aims to explicate the ways in which new language practices in education around ICT use, construct the literate, or intelligent subject by examining how intelligence is constructed through pre-service teachers’ language practices around ICT use. Intelligence is not a precondition for the development of the literate subject but a socio-political effect of powerful traditions of language practices. Consequently, a poststructuralist research framework does not aim to identify the ways in which ICT practices in the classroom can improve learning outcomes by, for example, promoting higher order thinking and improving creativity and productivity, as these conceptual categories do not exist outside of, or prior to, the literacies, or socially regulated language practices, which enable and authorise their development.

Educational discourses frequently conflate literacy and intelligence by reframing literacy as various, discrete and measurable skill sets. Conflating literacy and intelligence maintains the neutrality of pedagogical processes, justifies the measuring and rewarding of individuals who best represent hegemonic norms, and lays the blame for failure upon the individual, rather than the broader social system. Ladson-Billings (1998) argues that, under these conditions:

Instruction is conceived as a generic set of teaching skills that should work for all students. When these strategies or skills fail to achieve desired results, the students, not the techniques, are found to be lacking. (p. 19)

The “increasingly tight and anxious linking of ... literacy to a vision of social improvement” (McWilliam & Lee, 2006, p. 46) also lays the burden of large-scale social problems on the shoulders of teachers (Lankshear & Lawler, 1987). To argue that teachers are responsible for delivering a supposedly neutral, one size fits all literacy program, the success of which is, in part, assessed through standardised testing, is to direct stakeholders’ attention away from other issues that have an impact on educational outcomes, such as government policy and funding, student/teacher ratios, and the values and priorities of fast capitalist economies.

At the same time, increased socio-cultural complexity, and new literacy requirements associated with new technologies and new modes of communication, are placing increased pressure on the curriculum to the point where “schools have to run in order simply to stand still” (Lankshear & Lawler, 1987, p. 135). It is, therefore, ironic that while educators are expanding the concept of literacy as a response to the increasing push for ICT use in schools, the Australian government is seeking to standardise literacy practices. Bigum and Green (1992) claim this represents the scientisation of education:

“Science” functions therefore as a metanarrative *par excellence* in the work in question here, specifically in the area of information technology and literacy education, being effectively and even paradigmatically an emblem for the ideological union of reason and progress. (p. 20)

Lather (2003) argues that the intelligibility and power of scientific discourses “demands that language conform to hegemonic and rigid hierarchies, systems of formulation, standards of truth within a logic of solid mechanics” (p. 11). In this respect, the scientisation of education also represents a means of containment of, and control over, socio-cultural development.

Further investigation into the connections between literacy, technology, and culture (Snyder, 1999) is required to understand how new technologies affect classroom pedagogies and the political structure of institutions such as education. Good intentions and seemingly good projects may have results that are not desired or positive (Kellner, 2002). Critical theories and critical pedagogies seek to intervene in cultural processes by identifying the limitations of available subject positions at a given site, and envisioning new ones (LeCourt, 2001). Transformative social design is only possible however, if canonical knowledges are re-examined and demystified (Luke & Gore, 1992). Feminist poststructuralist research frameworks aim to not only examine how subjects enact those identities made available through the language practices validated by, and operating within, specific cultural contexts but also to open up and validate new spaces for the enactment and development of new social perspectives (Lather, 1991b).

Zuga (2007) points out that American “technology education research does not suffer from a lack of question, but from a lack of people willing to ask the difficult questions and study them in a rigorous manner” (p. 5). Petrina’s (1998) criticism, that very few studies of ICT in education are undertaken against a backdrop of the politics of education, serves

to illuminate the nature of those difficult questions. Petrina (1998) argues for more critical, outward-looking studies instead of “uncritical, insular research” (p. 21), and Lewis (1999) takes up the call for culturally framed questions by asking:

- How do we come to practice and understand technology?
- Toward what ends and means is ICT practised?
- Who participates in ICT use and why or why not? (p.2)

This research engages with the politics of education by contributing to the production and critique of “a new discursive field linking literacy, technology and educational practice” (Bigum & Green, 1992, p. 18). Feminist poststructuralist research provides access to alternative perspectives on educational practices through a rereading of dominant discourses, as epistemic practices, or ways of knowing, that construct human purpose and progress from particular historical and epistemological standpoints (Luke, 1997).

1.3.3 Constructing the subject: The politics of literacy

As “subjectivity, identity and knowledge *are* the work of schooling” (Luke & Gore, 1992, p. 2), this thesis foregrounds the importance of examining how subjectivity is produced through pedagogical encounters. Emphasising the centrality of language in the construction of subjectivity (Butler, 1990; Foucault, 1978; Grosz, 1994; Weedon, 1987) also enables crucial links to be made within and across disparate knowledge frameworks such as feminist-poststructuralist theory, posthuman theory (Hayles, 1999a), educational theories and fields related to computer science.

The subject that constructs meaning, and the language that constructs subjectivity, work together as a relational proposition: both producing, and always located within, a tension that contributes to networks of power that construct and define socio-cultural realities by privileging some epistemic practices over others. In this respect, “the study of literacy (or language, more generally) transcends any one discipline” (Gee, 2003, p. 13) as language is a fundamental technology (Bigum & Green, 1992). Postman (1992) describes language as “our most powerful ideological instrument” (p. 123), because it constructs subjectivity and the subject’s relationships within the world by naming and separating elements, developing categories and relationships, and creating a framework for constructing and communicating meaning. Juxtaposing the term ICT with literacy in educational computing,

therefore, articulates a “not-so-innocent connection between technology and ideological reproduction” (LeCourt, 2001, p. 86).

Literacy expresses a moral and political endeavour (Lankshear & Lawler, 1987). Literacy is about effective and discerning language use, and what constitutes literacy in any given context both reflects, and is defined by, the privileged tools and processes for constructing meaning within a specific historical and socio-cultural context. Current definitions of literacy, however, are expanding so that “literacy has become multiple” (Snyder, 2008, p. 219). The constantly changing and contextual nature of literacy means that attempts to standardise and measure literacy is highly problematic (Kalantzis & Cope, 2000; Luke, 1997), as any “adequate definition of literacy must incorporate changing literacy demands in some meaningful way” (Venezky, 1990, p. 13).

This research investigates the socio-cultural effects of changing literacies and engages with new and emerging theories of language, literacy and learning by examining the new literacy demands represented by the increased presence of multi-modal and interactive technologies in the classroom (Cope & Kalantzis, 2000). This research also critiques the rationale behind the push for new ICT literacies in schools, particularly in view of the Australian context of contemporary media debates about literacy, technology and education. The following examples demonstrate the theoretical tensions between literacy and technology that makes ICT literacy such a challenging field for educationalists and demonstrates the contradictory politics of literacy practices in the digital age.

1.3.4 The contradictory politics of contemporary literacy debates

Pre-service teachers’ written texts acknowledge two, seemingly incompatible, conditions for the development of a functionally literate society. This research, therefore, also examines and theorises the relationship between a demand for a return to basic literacy skills, and the demand for students and teachers to respond to an increasingly complex, constantly changing and “technologised world” (Bigum, 1997, p. 249), through the use of increasingly complex, constantly changing and technologised literacies. This thesis also argues that the pressure to find a place for new technologies in the classroom reflects the escalating corporatisation of education (Bigum, 1997; Snyder, 1999).

During the period of this research, there has been ongoing debate in the media about literacy standards and teaching practices in Australian schools. Much of the criticism has been aimed at issues such as: critical literacy (Slattery, 2005a); the use of popular texts (Slattery, 2005b); the whole language approach (Bantick, 2005); postmodernist and poststructuralist theories (Slattery, 2005b); and the deconstruction of classical texts (Dawson, 2004). In 2004, the Federal Education Minister declared the need for a national inquiry into the teaching of literacy. One article reported:

Should the Federal Government become involved in the teaching of reading in Australian schools, it is likely to result in the end of the whole-word approach. For many people, that would be a good thing. (Bantick, 2004, p. 16)

A return to the basics promotes an understanding of literacy as a purely technical skill that can be measured and assessed as a standardised product. A return to the basics coheres with a “prescriptive approach” (Coupal, 2002, p. 31) to literacy, in which literacy is defined as a set of discrete and reproducible steps. This means that the ability to comply with discrete literacy tasks determines the effectiveness of students’ literacy skills. A narrow, skills based, prescriptive approach to literacy (Bigum & Green, 1992) also marginalises critical pedagogies that explore meaning making processes and aim to make visible the values that are encoded in the language practices of contemporary cultures. In contrast to a prescriptive approach, a more holistic and critical view of literacy practices aims to empower the individual with greater understanding and control over meaning making processes (Snyder, 2001b).

At the same time, however, teachers are reminded of the need to maximise the use of new technologies in the classroom in order to “prepare future citizens for a life of high-skill, high-technology-based work” (Bigum, 1997, p. 249). There is also a push from the computer industry to prepare students for change in an increasingly complex world:

Australia will continue to lose ground to other nations in the global knowledge economy unless urgent attention is given to the supply of computer and Internet equipment to schools. The ACS president called for the immediate provision of a national competency standard for computer literacy in secondary schools; ongoing professional development to ensure teacher proficiency with ICT; and adequate funding for all schools to supply ICT hardware and software, employ technical staff and access appropriate broadband connections. (Australian Computer Society, 2004, para. 1)

It is not surprising that teachers struggle to accommodate the contradictory demands for traditional and innovative literacy practices. The tension between the two contesting discourses has produced an ambiguous response from teachers who are acceding to the ICT rhetoric of change and innovation, while concurrently focusing on the development of students' basic literacy skills with standardised testing in mind. A report issued by education.au limited (2005), the national information and communications technology agency owned by Australian Ministers of Education and Training, acknowledged that the education and training sector has not kept up with and appropriated for education and training purposes, the technologies its students are using on a day-to-day basis. It recommends ongoing professional development to facilitate the necessary technical and cultural shifts in teaching and learning practices:

Students today are "native speakers" of the digital language of computers, video games and the Internet. Many devices described in this report are banned by schools. A shift in culture is crucial to ensure that students' uses of these devices are embraced as educational opportunities and that they become tools of the trade, rather than be considered contraband. (education.au limited, 2005, p. 2)

1.3.5 Locating agency

A key factor often overlooked in literacy debates is related to the defining limits of empowerment for teachers and students as a result of their literacy practices. One can, for example, be empowered to excel within the knowledge frameworks that promote fast capitalist values and practices (Gee & Lankshear, 1997). In this case, agency is dependent upon the ability to work effectively with privileged language practices. While it is not possible to stand outside the regulatory structures of established knowledge frameworks, it is nevertheless possible to question the vision, values, ends and goals that are constructed as a result of those practices, in which case, agency is dependent upon the ability to critique and reshape those ways of knowing for the purpose of opening up and endorsing new and alternative subject positions.

The Australian Computer Society's (2004) call to technologise the practice of teaching, while not new or unexpected, is unsettling due to the effects of new textual practices on changing patterns of social interaction and shifting power relations in education. Language is not a neutral medium for representing the world. If literacy is presumed to be neutral, "teachers and other purveyors of literacy are absolved from having to consider

what the end consequences are of their activities” (Lankshear & Lawler, 1987, p. 50). Privileging fast capitalist knowledge frameworks that promote increased rates of production, consumption and change and the increased use of ICT in schools, while concurrently acceding to administrative demands for a return to literacy basics, foregrounds the tensions between the need for teachers and students who can think for themselves, and “the possibilities that independent thinkers might question the very ends and goals of fast capitalism itself, ironically making them very poor fast capitalists indeed” (Gee & Lankshear, 1997, p. 87).

1.3.6 Discourse

The term discourse is used in this thesis to refer to a publicly acknowledged “regime of truth ... [so that] truth becomes a function of what can be said, written or thought” (McHoul & Grace, 1993, p. 33) and represents a system of ordered procedures for the production, regulation, distribution, circulation, and operation of statements (Foucault, 1980). Wetherall, Taylor and Yates (2001) elaborate further, writing:

Discourses are historically variable ways of speaking, writing and talking about, as well as practices around, an issue. They have outcomes/identifiable effects, which specify what is morally, socially and legally un/acceptable at any given moment in a culture. (p. 274)

This research aims to make visible the discursive currents produced by the convergence of two powerful discourses, ICT and education, and engages with Snyder’s (1999) question: “what are the implications for ... the training of pre-service teachers?” (p. 12). This is not only an important first step for recovering a sense of agency in the digital age (Lankshear, Peters & Knobel, 2000), but also a means for enabling and authorising the development of critical pedagogic frameworks for understanding the role of ICT in education:

A critical theory of technology sees the limitations of pedagogy and educational proposals based primarily on technology without adequate emphasis on pedagogy, and on teacher and student empowerment. (Kellner, 2002, p. 156)

This thesis responds to a void in the literature on educational computing, theorising the less visible outcomes of ICT in education (Lankshear et al., 1997). In particular attention is paid to the discursive and symbolic elements of ICT practices in education and the way in which such practices construct student and teacher subjectivities (Wallace, 2002). This research, therefore, is not directed at the what of ICT in education, which indicates a more prescriptive research framework. Instead, this study focuses on the why, how, and for

whom of ICT in education in order to foreground the political issues of agency and identity, access and equity.

Consequently, this research does not attempt to identify and encapsulate the hundreds of papers and articles that deal with pedagogical issues around curriculum and technology (Sanders, 2005), as the majority of studies involving ICT reflect predominantly positivist, quantitative or descriptive research agendas (Kaptzke, 2003; Petrina, 1998). Instead, the identification of literature relevant to this study is informed by the need to address the dearth of studies in the critical paradigm (Lewis, 1999). At the same time, however, it is important to note that a critical research approach is not undertaken to deny or discredit the many positive outcomes of ICT use in education, such as increased access to information, ease of textual publication and presentation, and enabling the representation and dissemination of marginalised worldviews.

1.3.6.1 Problematising determinist research approaches to ICT in education

Feminist poststructuralist research (Lee, 1992) does not claim or seek a neutral position from which the literature on the subject can be objectively selected and reviewed but aims instead to identify the literature that serves as a counterbalance to determinist and instrumental approaches to research on ICT in education (Warschauer, 1998). Determinist approaches to research on ICT in education are reactive: an “inevitable response to large-scale technological change” (Bigum, 1997, p. 247). A determinist perspective privileges the presence of ICT in the classroom by shifting understandings of pedagogical frameworks to accommodate the new technology:

Computers, if not materially, at least symbolically provide schools with the means of appearing to respond to an increasingly technologised world by becoming increasingly technologised themselves. (Bigum, 1997, p. 249)

Constant change and technological innovation means that educational research and the development of teacher pedagogy take up a reactive, rather than a proactive stance. Schools’ ongoing investment in ICT is reflected in the changing language practices of education. Terms such as, multiliteracies, computer literacy and technological literacy, combine technology and literacy to associate ICT competency with social competency and progress. This is an example of literacy for technology (Bigum & Green, 1992), where

available technologies determine what literacy is and how social relationships can best be conducted.

Furthermore, a determinist approach to ICT research marginalises the teacher in the teaching and learning process. Instead of asking, for example, how teachers' use of ICT in the classroom affects learning outcomes, the question shifts to ask how ICT affects learning outcomes irrespective of teacher pedagogy (Warschauer, 1998).

1.3.6.2 Problematising instrumental research approaches to ICT in education

Another approach to researching ICT in education is based upon the premise that ICT is "simply a tool – and a benign tool at that" (Knobel & Lankshear, 1997, p. 2). This is the instrumental view, which "downplays how new technologies affect the broader ecology of the language learning environment" (Warschauer, 1998, p. 758). An instrumental approach to understanding the role of ICT in education supports determinist perspectives by obscuring the political effects of ICT use on classroom relationships and teacher pedagogy.

Technologies are never neutral elements in the practice of education (Lankshear, 1997; Postman, 1992). With the development of new technologies, the potential to construct new understandings and act upon the world in new ways increases (Postman, 1992). New technologies, however, do not simply augment aspects of a culture, but also diminish some aspects by reconstituting and reordering subjectivities, social values and priorities. Teachers and students, therefore, do not merely use technologies but are in/formed by them (Kellner, 2002).

Teachers' understandings of the role of ICT in education are informed by the skills and processes required for making and utilising the artefact effectively and appropriately, and the new social interactions, identities, values and relationships that develop around its use (Millar, 2000). The introduction of ICT into a school, for example, immediately creates its own imperatives, such as the demand for the latest hardware, software and network packages, as well as the privileged social positions that affirm the benefit of ICT use, including technical staff and students and teachers with ICT skills. Consequently, the introduction of ICT into the classroom changes the practice of education: redefining what teachers are by changing what they do, redirecting their attention to different classroom processes and outcomes, and providing a new interpretive framework for understanding

students' learning processes by re-defining key educational concepts such as literacy, interaction, authenticity and creativity (Lankshear, 1997) in the micro context of classroom practices, and broader concepts such as nature, knowledge and human progress (Bigum & Green, 1992) in the macro context of institutional discourses.

1.4 Theoretical position

The theoretical position of the researcher influences the research focus, determines the research priorities, and shapes the method and techniques required for the research process (Liamputtong & Ezzy, 2005). For this reason, it is important to link the researcher's ontological and epistemological position to the research aims and questions, as well as the methodological principles, which inform the processes of data collection and analysis. Symes (1992) explains that "theories are like lenses, magnifying certain quarters of inquiry and diminishing others" (p. 36).

1.4.1 Poststructuralist theory

This research is informed by poststructuralist theory, which views language and discourse as the building blocks for the construction of social realities. Understanding the complex web of relationships (Hammersley, 2000), and the multiple perspectives that constitute social reality, requires a theoretical framework that acknowledges, and works productively with, multiple truths. Poststructuralist research frameworks acknowledge (Lee, 1992) the relationship between multiple truths and consensual social design by redefining the concept of truth to represent a shifting and negotiable location between one's own perspective and the perspective of the other (Ezzy, 2002).

Poststructuralist theory acknowledges that access to, and understandings of, semiotic systems, which construct and order our experience of the world, are never neutral (Foucault, 1980). From this perspective, an understanding of literacy requires an awareness of language as being greater than the sum of its parts. Language is also a political enterprise (Anstey & Bull, 1996), which determines and regulates meanings and relationships and is, therefore, constitutive of how we think about, value and interpret the world.

Poststructuralist emphasis on the plurality of meanings, and the impossibility of fixing the relationship between representation and meaning once and for all, (Weedon, 1987) opens up possibilities for social change. Accordingly, the work of feminist theorists (Butler, 1990; Grosz, 1994, 1999, 2005; Haraway, 1991; Lather, 1991a, 1991b, 1996, 2000, 2003) has rendered all knowledge as being situated and embedded in social relations and practices, which are integrally political. Far from being relativist, feminist theories work to make visible and locate partial, critical knowledges within complex networks of power relations (Ezzy, 2002; Haraway, 1991). This type of critique initiates new conversations around social issues and can act as a catalyst for social change, not because subjugated knowledges are the whole truth, but because they include information and ways of thinking, which dominant groups have a vested interest in suppressing.

1.4.2 Feminist theory for transformative practice

Feminist theory also informs this research by bringing to attention the distinction between the normative body, constructed through hegemonic discourses, and embodiment as uniquely situated, constantly shifting corporealities represent individual subjectivities. Poststructuralist theory provides an invaluable foundation for feminist critique. A basic principle of poststructuralist theory is that of the plurality of meanings and the impossibility of fixing the relationship between representation and meaning once and for all (Weedon, 1987), thereby opening up possibilities for challenging and changing oppressive discourses.

Hegemonic discourses, which produce and privilege the normative body as white and male, are made open to plural interpretations by a feminist poststructuralist framework. Such a framework recognises that the capacity to construct meaning out of any system of signs is always dependant upon the unique experiences of embodied and located subjectivities as sites of, and for, discursive change. The terms embodiment and corporeality acknowledge individual and particular bodies as being the unique sites for the construction of subjectivities representing distinct and diverse perspectives on, and experiences of, the world. Subjectivities are located within a range of discourses, only ever present within the context of a particular confluence of discursive practices that construct time, place and culture. Embodiment, therefore, signifies the possibility of new meanings and represents the locus of and for change (Grosz, 1994), not as a fixed and

knowable entity, but as a site of difference from which oppressive discursive practices can be identified and contested.

Feminist theories continue to engage with issues involving ways of conceptualising the nature of being and the body. Nevertheless, both Foucault (1978) and feminists identify the body as a site of power and power relations (Sawicki, 1991). The task for feminist researchers, therefore, is to identify forms of subjection that engender particular types of bodies, and to problematise the silence and powerlessness of those upon whom various discourses, as technologies of power, have been imposed. In asking if teachers are becoming the “no/bodies of pedagogical work”, McWilliam and Taylor (1998, p. 29) are encouraging an increased awareness of bodies as sites of and for pedagogical work in order to challenge the “determinist assumptions on which the technological enterprise in schools has been built” (Bigum, 1997, p. 250).

The researcher’s understanding of the body as the site of cultural production is informed by the works of Grosz (1994, 1999, 2005) and Butler (1990) who argue the need to “render more mobile, fluid, and transformable the means by which the subject is produced and represented” (Grosz, 2005, p. 193). The body, as a discursively produced, normative site of representation and production of and for the enculturated and compliant subject, is amenable to change and re-organisation because of its ontological incompleteness.

The incompleteness of the body is signified by the ongoing processes of inscription and incorporation. Ways of being are inscribed upon the body through language practices. As the subject incorporates or enacts those practices, however, embodiment provokes a difference that is always referred back to the normative performance which, for many, represents an unattainable ideal. The duplicitous nature of bodies that serve as both a site for, and an effect of, the production of meanings is acknowledged by Grosz (1994), who writes, “The body is a most peculiar thing, for it is never quite reducible to being merely a thing; nor does it ever quite manage to rise above the status of thing” (p. xi). To objectify the body as a fixed and knowable materiality is to lose sight of the unique knowledges and relationships encoded in it.

Acknowledging and engaging with the complexities and paradoxes emerging from a feminist poststructuralist theoretical framework has often led to charges of relativism and

solipsism. One argument against these charges is that what counts as knowledge is always relative to a set of criteria, which are at best temporary and specific to the discourse within which it is produced. Furthermore, it is the very fluidity and plurality of discourses that make change possible. A feminist poststructuralist theoretical perspective (Weedon, 1987), therefore, does not cause meaning to disappear or regress, but instead foregrounds the importance of creativity and critique in the production of textual representation. New ways of knowing can only emerge if dominant meanings are made open to contestation and alternative meanings can only be affirmed or explored (Weedon, 1987) through new discursive structures.

Seen from a feminist poststructuralist perspective (Weedon, 1987), all discourses are inherently and unavoidably political. Discourses always work to validate some categories of knowledge and marginalise others. To understand knowledge as situated and embedded in social relations that are integrally political and practical undermines any pretension to be able to identify one final true account. Far from being relativist, a feminist poststructuralist standpoint makes visible, and engages with, partial, critical knowledges and identifies their significance within complex networks of power relations (Haraway, 1991; Lee, 1992; Weedon, 1987). In so doing, a feminist, poststructuralist theoretical framework enables a richer dialectic by offering a discourse that runs counter to “the words of white men engaged in conversations with themselves” (Yancy, 1998, as cited in Rogers, Malancharuvil-Berkes, Mosley, Hui & O’Garro, 2005, p. 4).

Feminist theories have made visible the tendency of poststructuralist claims to be implicated, caught up and entangled in hegemonic discursive regimes. Even feminist discourses can unwittingly elide the different experiences of marginalised groups of women such as lesbians, women of colour, and disabled women. Feminist theory maintains the worldviews of silenced or under-represented groups as critical elements of an emancipatory agenda. The relevance of marginalised groups and individuals should not be overlooked or underestimated as they have the potential to be catalysts for social change.

A feminist poststructuralist theoretical framework (Weedon, 1987) also foregrounds the need to know how and where knowledge is produced, by whom, and what counts as knowledge. The researcher, being always implicated in the construction of power relations,

must evince an awareness of who is valorised and who is marginalised by the discourses produced at the research site. This means that the researcher should not only look for patterns of textual production to identify dominant discourses but should also be mindful of gaps and silences in the data, as they signify areas of tension or conflict. Once a discourse is named and demystified and its effects made visible, it then becomes open to discussion and critique. In this way, feminist poststructuralist theory (Lee, 1992) provides a transformative framework for educational research.

1.4.3 Discourse: Constructing nature and knowledge

The Foucauldian (1972) concept of discourse that informs this research represents a profoundly dialectical process as discourse both shapes and is itself shaped by social entities. Discourses determine “not only how we view language, but also how we practise it” (Green, 2006, p. 3). For this reason, discourses and ways of being in the world are understood to be mutually constitutive (Lankshear & Knobel, 1998) and, most importantly, mutable. The reification of a unified self, as a stable identity, requires continual renewal and modification due to shifting discursive relationships and contexts. It is with this understanding that Phillips and Jorgensen (2002) declare that “people do not possess a set of fixed and authentic characteristics or essences” (p. 5). This position is further supported by Foucault (1980) who refers to technologies of power, and Luke (1997), who argues the regulatory nature of discourses as being an “internalized means for the self-discipline of action, practice and identity” (p. 3).

Tensions and inconsistencies within and across discourses represent the struggle between different knowledge claims. Phillip’s and Jorgensen’s (2002) claim that “truth is a discursive construction and different regimes of knowledge determine what is true and false” (p. 13) is significant for identifying and establishing the links between discourse, knowledge and power. This research, therefore, investigates how claims to expert knowledge are constructed and contested at the nexus of ICT and educational discourses.

1.4.3.1 The nature of ICT: An ontological position

Within the metaphors and fictions of postmodern discourse, much is at stake, as electronic technology seems to rise, unbidden, to pose a set of crucial ontological questions regarding the status *and power* of the human. (Bukatman, 1993, p. 2)

This section engages with the unfinished character of being (Grosz, 2005) in order to open up new possibilities for critical pedagogues. Freire (1970) argues that it is “in the interests of the oppressors to show the world as a fixed reality to which men must adapt” (p. 109), and for this reason, any ontological position that constructs ICT as a neutral tool needs to be problematised before more complex and relational positions can be taken up in this thesis.

References to ICT as a neutral tool sit in tension with a poststructuralist worldview that identifies language as the constitutive force behind the knowing subject. Language not only constructs the world, but also imbues it with a potentiality or value in terms of its meaning for individuals and for society. From a poststructuralist perspective, reality, as a discursive construct, is always, already virtual: only meaningful and accessible through the filter or “grilles” (Deleuze, 2002, p. 15) of language as signifying practices. Grosz (2005) argues that:

“The real”, “being”, “materiality”, “nature”, those terms usually associated with the unchanging, must themselves be opened up to their immaterial or extra-material virtualities or becoming, to the temporal forces of endless change, in other words, to history, biology, culture, sexuality. (p. 5)

Problematising the concept of nature or materiality within a feminist poststructuralist framework is one means of guarding against positivist readings of terms used in this thesis and “taking refuge in experience alone” (Weedon, 1987, p. 7). The use of words associated with positivist worldviews such as technology, object, materiality, reality, and the body, can promote unproblematic and innocent understandings of the world. Words construct a world separate from the subject who experiences it and are, therefore:

never adequate to the real of life and matter, but ... always attempts to contain them, to slow them down, to place them in a position of retrospective reconstruction in the service of life’s provisional interests. (Grosz, 2005, p. 42)

The use of positivist terminology in this thesis does not refer to objects or realities that pre-exist the subject who experiences it. Nor is it the intention of this thesis to speculate on a truth or a reality that exists prior to any publicly acknowledged existence, as the integrity of any ontological framework is always located within, and dependent upon, the mutually constitutive relationship between a culture, as a consensual public domain, and its language practices (Foucault, 1972).

That which can be publicly acknowledged as real is that which complies with the consensual perception of what can be named. The ontological position this thesis takes up is, therefore, an inversion of the thing-name relationship, whereby the thing is defined by the act of naming, a conundrum encountered by Margolis (1973):

Here, then, we see the convergence of epistemological and ontological considerations ... although the existence of anything does not depend on our knowledge of its existence, *that* it exists *is* nothing more than its accessibility to preferred criteria of existence ... existence, therefore, cannot be a perfection of anything – cannot be a property necessary to anything. It is a second-order relational property ... the epithets merely reflect alternative ontological tastes. (pp. 110-111)

To read this argument from a poststructuralist viewpoint is to understand that it is not possible for educators to talk about or understand ICT as a tool without referring to the concomitant language categories and social, historical and cultural relationships that make it possible to construct and understand the object in the first place. Foucault (1984a) writes, “truth or being does not lie at the root of what we know and what we are” (p. 81). The subject, therefore, is always implicated in the maintenance of a corroborating, authoritative, epistemological framework that enables the production of objects and their truth effects. In this way, language situates the knowing subject within networks of power (Lather, 1991b; Weedon, 1987).

This ontological position does not deny that the world exists separately from ourselves, but it does problematise claims to natural, neutral or true representations. Consequently, any understanding of ICT as being a neutral tool is considered insufficient for understanding its socio-cultural effects, as the ability to understand the values and purposes and capacities of any object is a second-order, relational property of epistemic practices, which operate as a regime of truth (Foucault, 1980). While this argument leaves unresolved what exists, it nevertheless allows a minimal condition for admitting as eligible alternatives whatever theories concede a public world. It is from these minimal conditions that this thesis proceeds: not from innocent or natural origins, or essential truths, but instead, building upon the ruins (Lather, 2000) of totalising discourses.

Feminist poststructuralists’ attempts to accommodate and foreground ambiguity, instability and multiplicity have frequently been presented as a nihilistic and solipsistic

activity by those, whose knowledge is build upon, and who have an invested interest in, the maintenance of a positivist world view (Lather, 1996; 2000). These criticisms are panic discourses indicating a “fear of displacement” (Tierney, 2000, p. 236) and serve the purpose of marginalising alternative positions and maintaining the status quo. Such criticisms represent a totalising agenda of containment and consolidation through the maintenance of hegemonic discourses that construct universal notions of truth and justice. These ostensibly benevolent processes of integration and normalisation in the name of equality can paradoxically work to disempower contesting voices:

Equating justice with equal rights for all could all too easily change into equality of wrongdoing ... To function at all such partial individuals must be part of a larger system: equality of rights does not bring the freedom it promises but produces dependence through normalization. (Diprose, 1994, p. 91)

Revisiting fundamental ontological and epistemological assumptions, for the purpose of acknowledging and accommodating alternative realities is neither solipsistic nor regressive. It serves the very important purpose of making visible the gaps and contradictions in taken-for-granted knowledge practices and opens up spaces for different ways of being and knowing. In this way, theory can support the move towards plurality and inclusivity in educational practice.

1.4.3.2 ICT literacies: New epistemic practices

When a new technology is produced and put into circulation, new discourses and ways of knowing are also produced (Balsamo, 1996; Wajcman, 1991, 2004). One way to define the role of ICT in education, for example, is to call it a literacy. ICT is then constructed, not in terms of its material presence as a tool, but in terms of the specialised knowledges or disciplines, which inform its design, construction, purpose, use and repair (Balsamo, 1996; Wajcman, 1991, 2004). Related production and service industries, engineering and marketing divisions, health, broadcasting and surveillance authorities, environmental agencies, and online communities, to mention a few examples, all produce their own knowledges about how, when, where, and for what purpose, ICT should be used. Discourses that inform ICT use in broader social domains also serve to inform pre-service teachers’ understandings of ICT practices in education. Snyder (2008) writes:

What are the dominant ways researchers think about technology?
What does the research tell us about the ways in which digital technologies affect students’ literacy practices and their learning?

And how have literacy teachers, but also teachers more generally, responded to the use of computer technologies in education? Answers to these questions provide the kind of information about literacy and technology neglected in the print media but essential to understand the political and cultural context of the [literacy wars] debates. (p. 159)

The identification of dominant ICT discourses in a broader social context is, therefore, central to developing an understanding of research participants' experiences of ICT practices in education. Pre-service teachers' statements about ICT in education, for example, are only acceptable if they are accounted for within the regulatory structures of powerful institutional discourses.

1.4.3.3 ICT discourses: Constructing the disembodied subject

Embodiment and subjectivity are central to the issue of pre-service teachers' understandings of the role of ICT in education, as they represent the sites of, and for, pedagogical intervention. ICT discourses and practices, which provide additional categories for identifying and classifying competent or incompetent ICT related behaviours, are implicated in the construction of teaching and learning subjectivities. As new discourses circulate, new social relationships and subjectivities are produced as an effect of these discourses. New categories for interrogating and constructing the subjects and objects of discourses inform culture by redefining social relationships. Categories such as computer technician and computer programmer, for example, construct figures of authority or credibility. New forms of criminality or antisocial behaviour are also constructed such as hacking and cyber-bullying respectively.

Technologies are never neutral. They are always implicated in understandings of the body and world through the construction of the subject within discursive networks of power. One significant effect of ICT discourses is the marginalisation of corporealities as unique sites for the construction of individual subjectivities. When ICT discourses construct the electronic networks of the World Wide Web as a reality or domain that can be inhabited by individuals, they construct a world that is not informed by corporealities. For this reason it can be argue that:

The technological factor must be seen as co-extensive with and intermingled with the human. This mutual imbrication makes it necessary to speak of technology as a material and symbolic apparatus. (Braidotti, 2002, p. 348)

The disembodied subject that inhabits the fictional realm of cyberspace is made possible through discourse and is a demonstration of how “regimes of knowledge determine what is true and false” (Phillips & Jorgensen, 2002, p. 12). Claims that computers are becoming a fact of life, or computers are becoming a requirement to survive are rarely challenged because they are backed by privileged discourses that construct and authorise cyberspace as a primary social domain. Such discourses perpetuate the need to adapt to a new discursive territory, thereby shaping and informing other discourses.

Disembodiment is conceptually possible because language separates the object from the flux of sensory experience in which it is embedded. In so doing, language constructs a fundamental paradox: it replaces the thing it represents, thereby representing the absence of truth, rather than its presence. Foucault (1972) recommends, therefore, that instead of looking in the direction to which language refers, one should question the processes that give it utterance. Grosz (2005) supports this position, explaining that language:

Directs us to questions about being rather than doing; it gives identity and subjectivity a centrality and agency that they may not deserve, for they do not produce themselves but are accomplishments or effects of forces before and outside of identity and subjectivity. (p. 194)

The foregrounding of absence and the impossibility of identifying a unitary truth about the world or the knowing subject through language can open up a transformative dimension. Within a feminist poststructuralist framework, absence can be constructed as a productive dimension, offering new spaces for new subjects to take up and inhabit. Discourses operate as both enabling and constraining regulatory structures. Discourses are enabling because they make meaning possible by containing and fixing social realities, and stabilising power relations. The social being is not directly present, but always “in the process of becoming” (Diprose, 1994, p. 43) and it is the constant deferral, reworking and reifying of the subject that knows, that makes possible the inherent alterity and instability of language as a means for re/presenting the world. New subject positions strain against the mantle of a unifying truth, and in so doing they produce new tensions and reshape the discourses that construct the world and the knowing subject.

1.4.3.4 The normative body: Abstraction and control

The effect of language, as a regulatory, representational technology that produces the normative body, is discussed here in order to identify possibilities for teacher and student

agency, as teacher pedagogies enculturate individuals into social norms and values. The examination of the normative body constructed at the nexus of ICT and educational discourses, therefore, is intended to make visible pre-service teachers' construction of new educational teleologies, which inform the potential, purpose and progress of bodies. This section, therefore, explains how the reconfiguration of ontological boundaries by ICT discourses, which merges the biological with the technological, makes possible the re-visioning of pedagogical relations unmarked by gender, race, class, or any other signifiers of difference.

This thesis argues that a feminist poststructuralist position of ontological incompleteness (Grosz, 2005) renders the body a site of contested meanings: "unfinished, uncompleted beings in and with a likewise unfinished reality" (Freire, 1970, p. 57). From this position, hegemonic regimes of truth and contemporary ICT practices are considered to be neither essential nor immutable, so that the potential exists for its transformation. Consequently, the concept of ontological incompleteness is important for understanding how critical pedagogies can improve the conditions of agency for marginalised subjects through "an extension of the ontological field in which bodies may be given legitimate expression" (Butler, 1990, p. xxv).

Language is a technology that produces the normative body and shapes it to accommodate prevailing worldviews. Language constructs relationships as:

second-order things. It is not that technologies mediate between the human and the natural – for that is to construe technology as somehow outside either the natural or the human (which today is precisely its misrepresented place) ... rather, the technological is the cultural construction of the thing that controls and regulates other things, the correlate of the natural thing. (Grosz, 2005, p. 138)

Language constructs and deconstructs the boundaries of the subject in order to integrate unique and multiple ways of being into a regulatory discursive system that constructs the normative body as a knowable and, therefore, controllable object. The normative body is controllable because it has been rendered passive and dependent upon the system that defines it.

This thesis problematises hegemonic discourses that promote the normative body. The normative body is "always reductive and of suspect abstraction" (Butler, 1990, p. 176),

because this is a necessary condition for the emergence of a normative centre. The move towards the abstraction of the body and the construction of a normative centre is both empowering and disempowering for the subject. It is a positive process because it stabilises the production of signifiers by stabilising the production of the subject. In fixing and naming the world, the normative body enables the construction of a collective reality and consensus in meaning making processes. Hence “corporeal destruction is necessary to produce the speaking subject and its significations” (Butler, 2006, p. 177). The construction and distancing of the normative body through language practices enables the subject a reflexive and stable view of the self as part of a larger social structure.

While “there is no body as such; there are only bodies” (Grosz, 1994, p. xi), the concept of a normative body nevertheless exists as an apparatus of desire and power. Desire is produced through the tensions inherent in an incomplete and dependent subject that is only present as a result of the socio-cultural relationships that bear witness to, and constitute subjectivity. Desire represents the need to realise future potential as an idealised, autonomous subject, a distillation of selfhood to an impossible essence that exists independent of the meanings assigned by others.

Diprose (1994) points out that “the body as one lives it is both a cultural artefact and the site of change” (p. 82). Like technology, “the body is never just a thing” (Grosz, 1994, p.xi). The body is always normative in relation to a set of criteria, representing “the centre of perspective, insight, reflection, desire and agency” (Grosz, 1994, p. xi). Diprose (1994) adds:

Self-present identity is divided between what is present and what is not. Second, the subject is divided spatially between itself and an outside which it negates in order to be. The subject’s identity is divided between the here and the there, between itself and what it is not. ... No entity is autonomous or simply self-present and self-identical. (p. 40)

The subject must be constantly monitored and contained, as too much emphasis on difference threatens to undermine the normative relations that enable the formation of the stable, knowing subject. Consequently, the move towards the abstraction of the body and the construction of a normative centre is both empowering and disempowering. It is empowering because it constructs the unified subject whose individual agency is an effect of discursive tensions. Too much emphasis on the normative ideal, however, while

reducing discursive tensions by making them less visible, also diminishes the control of the individual over the meaning making process.

1.4.3.5 Embodiment and the production of gender

Lather (1992) writes that “feminism has much to offer in the development of practices of self-interrogation and critique, practice-based theorising and more situated and embodied discourses about pedagogy” (p. 131). This thesis foregrounds the work of Foucault (1972, 1978, 1980) and feminist theorists such as Lather (1996, 2000, 2003), Hayles (1999a), Grosz (1994, 2005), Spender (1980, 1995) and Butler (1990) in order to problematise the normative body by foregrounding the effects of disembodied discourses upon the construction of teaching and learning subjectivities, particularly as these identities are developed in relation to the new ICT literacies promoted in educational contexts. Embodiment refers to the unique sites upon which the normative body is inscribed to produce the knowing and unified subject. Embodiment (Grosz, 1994) is the perceived resistance instantiated by unique and partial perspectives that separate the knowing subject from the normative body. The subject is uniquely located within a number of contesting discourses so that any performance of the normative body through incorporating practices creates a tension: a sense of difference and distance from the centre. The normative body creates the myth of the unified subject. In contrast, embodiment identifies the subject as a unique site, which is “not a being but a variable boundary, a surface whose permeability is politically regulated” (Butler, 1990, p. 189).

The abstraction of the normative body produces a paradox (Grosz, 1994). The normative body both enables the expression of the individual subject and conceals the peculiarities of embodiment. The subject emerges as a result of a constant negotiation between the normative body and embodiment. This paradox is reflected in the tension between binaries such as self/other, good/bad, mind/body, technological/biological and male/female, that construct the values and relationships that constitute a culture. These binaries are mutually constitutive as they are defined by difference. Consequently, binaries fuel the political tensions that construct the fabric of embodiment and those subjects who most closely comply with the discursively produced normative body benefit most in terms of social access.

Butler (1990) points out that “males within this system participate in the form of the universal person” (p. 154). Inscribed upon all bodies are the generic terms mankind, man and he. Through repetitive language use, women’s bodies have been subsumed under the male term. Consequently, an important discursive bias has been made less visible and, therefore, more difficult to contest. The bias constructed through language is, however, more acutely felt when the supposedly generic term is applied to traditionally female roles:

Can we say without a clash of images that *man* devotes more than forty hours a week to housework or that *man* lives an isolated life when engaged in child rearing in our society? A note of discord is struck by these statements and it is because *man* – despite the assurance of male grammarians – most definitely means male and evokes male imagery. (Spender, 1980, p. 156)

When the male image is repeatedly enacted as the universal or normative body through the conventions of language use, female terms such as she, woman, and womankind represent the deficient other. As men continue to refuse to be subsumed under the generic terms she or woman, they enact their position of dominance and control and construct the category, woman, as representing the passive and incomplete other.

Gender is a cultural effect of powerful discursive traditions and this thesis argues that “the sex of the teacher is caught up in the message systems and power structures” (Kenway & Modra, 1992, p. 146) of education. This argument can be extended to include class, race, ethnicity and any other markers of difference. Identifying individual variations from hegemonic norms renders teacher or student behaviours more problematic than the constraining structure and arbitrary boundaries of curricular knowledge frameworks or the limited perspectives afforded by dominant educational discourses. Consequently, normative discourses promote a deficit model for understanding teaching and learning in institutional contexts (Kenway & Modra, 1992).

Once gender has been inscribed upon the subject and reified through discursive processes, it cannot be so easily erased, as all ensuing social processes are informed by the political tensions constructed by the male/female binary. The development of subjectivity does not precede the gendered discursive relationships that enable knowledge of the self. Butler (1990) explains that the subject only appears fixed and natural as a result of “signifying practices that seek to conceal their own workings” (p. 197).

The enactment of gender is “always contextual and perspectival; enmeshed within the specifics of place, time and culture” (Hayles, 1999a, p. 196), and the embodied subject is the site upon which the normative body is inscribed:

Like the body, inscription is normalized and abstract, in the sense that it is usually considered as a system of signs operating independently of any particular manifestation. (Hayles, 1999a, p. 198)

1.4.3.6 Incorporation: Locating agency

Being constituted by discourse is not equivalent to being determined by discourse. Transformative pedagogies can be enacted through the representational gaps opened up by multiple and contesting discourses as they are produced at uniquely embodied sites. These productions are referred to in this thesis as incorporating practices. Incorporation enacts a relationship to the normative body. Individual subjectivities are constructed as a result of their difference from the normative body, which acts as the idealised centre for meaning making. Incorporating practices always deviate in some way from the norm, because relative to the normative body, embodiment is always “other and elsewhere, at once excessive and deficient in its infinite variations” (Hayles, 1999a, p. 196):

The injunction to be a given gender produces necessary failures, a variety of incoherent configurations that in their multiplicity exceed and defy the injunction by which they are generated. (Butler, 1990, p. 199)

Through the repetition of signifying practices, the significance of bodies is enacted and reified within the tensions of a range of binaries: as self or the other, the internal or the external, rational or emotional, technological or biological:

The coexistence or convergence of such discursive injunctions produces the possibility of a complex reconfiguration and redeployment; it is not a transcendental subject who enables action in the midst of such a convergence. (Butler, 1990, p. 199)

Incorporating practices repeatedly enact a difference: a position away from the centre. Even the wave of a hand, for example, enacts gender. When a man offers a minimal salute with a firm wrist he is re-inscribing his position as a masculine subject through an incorporating practice. It is in the tension between inscribing and incorporating practices,

between the normative body, as the ideal, and embodiment, as the always less-than-ideal, where desire is produced and possibilities for agency and change occur.

Embodiment is unruly, unreliable, and rebellious and for this reason, embodiment also serves as the catalyst for social change and makes possible individual agency and creativity:

Because embodiment is individually articulated, there is also at least an incipient tension between it and hegemonic cultural constructs. Embodiment is thus inherently destabilizing with respect to the body for at any time this tension can widen into a perceived disparity. (Hayles, 1999a, p. 196)

Subjectivity is enacted differently as it intersects with a range of discursive modalities such as gender, sexuality, race and class (Butler, 1990). At points of interchange there is a blurring, a distortion, a readjustment to and calling into question of the abstract norm. For this reason, Ellsworth (1992) argues that the task of the critical education is to find ways of “working with students that enable the full expression of multiple ‘voices’ engaged in dialogic encounter” (p. 101).

Luke (1997) explains that “feminist pedagogy does not disclaim foundation; instead, it grounds its epistemology on a foundation of difference” (p. 48). In resisting or refusing to adopt the subject positions privileged and validated by hegemonic discourses, feminist research aims to make visible and draws attention to the gaps and inconsistencies in our social realities. Ambiguity, and alternative forms and systems of representation, then emerge as constitutive forces for the construction of new categories of textual practice and new subject positions.

1.5 Problematising voice

The researcher’s voice, constructed through the research text, is inextricably linked to issues of representation, reflexivity and ethics. Feminist poststructuralist theory (Weedon, 1987) problematises attempts to represent a unified subject. While feminist approaches call for messy texts that represent multiple and decentred subjectivities (Lather, 1996; Lenzo, 1995), poststructuralist theory critiques all approaches to research writing as being tenuously linked to the lived experiences of research participants. Both approaches,

nevertheless, stress the need to deconstruct and destabilise meanings and conventions that are taken for granted and appear natural.

When researchers enter the field they constitute a new node in the network of relationships they encounter. Consequently, what is represented is a uniquely situated activity that constructs and locates the researcher as an observer of and in the world to the same extent that it constructs and locates the research participants as part of the world to be observed. That which is represented in the research text, therefore, is not the lived experiences of the research participants, but only those associations that can be observed within a research context and named, fixed and communicated by the researcher through the discursive framework of an academic genre.

Although the first person voice can be used as a means of reminding the reader of the embodied site of knowledge production, the first person voice also constructs the author as a unified and stable subject: the agent in the research process, who confers meaning upon the objects and relationships under observation. This is a problematic position in view of the numerous roles undertaken by the researcher in the course of the study, many of which are not directly related to the research but nevertheless inform the values, experiences and perspectives that are brought to the analysis and interpretation of research data.

Consequently, the use of the first person voice for declaring how I think, I believe, or I feel, is deliberately avoided in this research text, as it can work to locate the researcher within a range of subjective niches, resulting in a confusion of research perspectives that can turn the writing process into a series of performances that locate the author at the centre of the text:

It is useful fiction to imagine that we as subjects are masters or agents of these very forces that constitute us as subjects, but it is misleading, for it makes the struggle about us, about our identities and individualities rather than about the world; it directs us to questions about being rather than doing; it gives identity and subjectivity a centrality and agency that they may not deserve, for they do not produce themselves but are accomplishments or effects of forces before and outside of identity and subjectivity. (Grosz, 2005, p. 194)

The I of any text is a fictitious entity governed by the conventions of language use that marks the limits of academic genres. There is need, therefore, to call attention to, and

critique, the legitimating and normative truth effects of academic genres informed by the first person voice as “the ‘I’ can never be outside of any language structure” (Butler, 1990, p. xxvi).

Instead, references to this research or to the researcher are used in this thesis as a device intended to distance the reader from the text, and to remind the reader of the problematic nature of authorship. Texts do not signify a fixed and unified subject any more than language represents a pre-existing reality:

Discourses don’t merely represent the ‘real’, and if in fact they are part of its production, then which discourse is ‘best’ can’t be decided by comparing it with any real object. The ‘real’ object simply isn’t available *for* comparison outside its discursive construction. (McHoul & Grace, 1993, p. 35)

“Authorship is the appropriation of a range of selected discourses” (Tamboukou & Ball, 2003, p. 17) for particular purposes, so that the author emerges as an effect of textual practice, rather than the other way around. Through the act of textual production the author comes into being. Foucault (1984b) explains that “the author does not precede the work” (p. 119), because the author, as a discursive effect, remains located within, and defined by, the textual artefact. In this respect, the third person voice is more open to contestation, critique and reconstruction than the first person voice that speaks of and from one or more uniquely located experiences and constructs, as a result, an incontestably positioned way of knowing.

The irony of declaring any authorial position within a poststructuralist framework lies in the metaphoric quality of language practices. Language works to fix and reify what is experienced as a shifting reality, and there is no position outside language, from which one can relate a constantly changing and temporal way of being or knowing. There can never be a right or true way to represent a contingent, continually emergent and situated reality (Lather, 1991b), only a reflexive revisiting and repositioning of ideas and experiences through discursive techniques and devices. The researcher who writes these words will return to them repeatedly and critically, as editor and reader, at different points in time. Unlike the happy endings in popular narratives, however, the researcher as the subject who experiences the research process and the researcher as the one who constructs the printed text, never resolve their differences to live happily ever after. Every re-reading works, instead, to emphasise the different perspectives they represent.

Furthermore, assuming a third person, academic voice does not prevent the researcher from taking up a privileged discursive position in the research text. As Lenzo (1995) points out, there will always be “serious limits to our abilities to self-critique” (p. 18). Context also comes into play when the researcher’s need for presenting a cohesive and accessible account of the research process sits in tension with a feminist call for messy texts and “new languages to create spaces for resistance” (Lather, 1996, p. 529). Conflict remains, therefore, between the need for clarity, the requirements of academic genres and the need to deconstruct and destabilise texts that construct a seamless, linear reality: a reality that is made known and reified through conventional language practices.

Choice implies intention and value judgments are unavoidable in any research situation. Writing styles not only represent “the historically shifting domination of particular schools or paradigms” (Richardson, 2000, p. 925), but are also a constitutive force in the representation and promotion of the researcher’s worldview. In this respect, reasonable language is also dangerously deceptive language, as it can create a teleological momentum towards an unveiling of something that can serve as a truth. The constant reiteration of this research and the researcher in this thesis, therefore, emphasises the need to be aware of the research artefact as “an interrogative text that reflects back at its readers the problems of inquiry at the same time an inquiry is conducted” (Lather & Smithies, 1997, p. 285).

1.6 Thesis overview

1.6.1 Literature Review

In order to locate the research question, how do pre-service teachers understand the role of ICT in education, in a broader socio-cultural and historical context, chapter two of this thesis begins with a genealogical approach to the construction of teaching and learning subjects, presenting a “critical ontology of ourselves” (Foucault, 1984c, p. 50). This approach also serves the purpose of explaining how new computer metaphors are able to reconfigure the boundaries of the body and establish new forms of subjection, thereby both enabling and constraining ways of conceptualising and talking about the role of ICT in education.

The genealogical focus is limited to the formation and transformation of the body within the closely interwoven discursive frameworks of science and cybernetics. The intention is to provide a brief history of the body in order to theorise the current construction of new bodies for the digital era. Hayles (1999a) refers to these new bodies as posthumans. In particular, the cyborg metaphor is presented as symbolic of new literacies, or “new rituals of power” (Carabine, 2001, p. 276), through which technologies of and for the body are forged. A discussion of the cyborg metaphor explains how the interrelated discourses of science and cybernetics have constructed new regimes of truth about the nature of human being. The cyborg re-informs the purpose of education by re-defining the boundaries, deficiencies and potentials of future teaching and learning subjects.

The second half of chapter two examines how current understandings of the relationship between literacy, education and technology are influenced by powerful computer metaphors and digital narratives, which rework the relationship between the subject and the world. The implications of posthuman theory are discussed, and the contesting perspectives produced by the “human/machinic convergence” (McWilliam & Lee, 2006, p. 57) is examined and problematised.

1.6.2 Research design

Chapter three situates the research methodology within a poststructuralist theoretical framework, which recognises the centrality of language and discourse in the construction of the knowing subject. This ontological position does not deny or confirm the existence of a physical world separate from, and pre-existing the knowing subject, but instead makes the very different assertion that knowledge of the world is only possible through the regulating structure of privileged discourses (Foucault, 1972; Laclau & Mouffe, 1985; Phillips & Jorgensen, 2002). Having problematised all epistemic practices by locating the research within a feminist, poststructuralist theoretical framework (Lee, 1992; Weedon, 1987) that constructs all knowledge as partial, perspectival and embedded in power relations, the methodological question, “how can we find out whatever it is that we believe we can come to know about a social phenomenon?” (Imel, Kerka & Wonacott, 2002, para. 7), is introduced here and discussed in greater detail in chapter three.

1.6.2.1 Qualitative methodology

Chapter three argues the case for a qualitative, mixed methods approach, combining Foucauldian critical discourse analysis (Carabine, 2001) with constructivist grounded theory (Charmaz, 2000, 2006). Both analytic approaches call attention to the ways in which language and other signifying practices figure as elements of social processes. Furthermore, chapter three makes the case that, through their strong commitment to social constructivist research agendas, both critical discourse analysis (Carabine, 2001) and constructivist grounded theory (Charmaz, 2000, 2006) cohere with and support feminist poststructuralist perspectives.

It is important to note here that this research does not claim that the use of multiple methods of data collection or analysis is more valid than a single method approach. From a poststructuralist position, no interpretation of qualitative data is ever complete, as meanings and interpretations constantly change in response to the changing conditions of contemporary culture. Rich and multiple sources of data, and the application of constructivist grounded theory (Charmaz, 2000, 2006) nevertheless facilitates a more rigorous and systematic approach to analysis, while also generating multiple levels of abstraction, thereby articulating complex relationships between codes and categories. The terms rigour and detail, often associated with positivist grounded theory methods (Glaser, 2001), are not used in this research to refer to a truth about the data, but instead signify, within a post-positivist research framework, the intention to inform and enrich future research design and practice through a more transparent and critical reading of the research methods.

Finally, the methodology chapter discusses the limitations of the study, foregrounding the unpredictable nature of researcher/participant relationships and the need for qualitative research design to allow some flexibility for decision making to take place as the research proceeds, especially when data gathering and sampling decisions are made in the light of evolving analysis and inductive theory building (Mason, 1996). This research text, for example, does not represent a linear, inflexible research design. Its structured and sequenced narrative belies the emergent and circular processes of knowledge production, which, at the time, served to perplex as much as to shed light upon matters.

1.6.2.2 Analysis

Chapter four explains how constructivist grounded theory (Charmaz, 2000, 2006) has been used to analyse the research data and facilitate an inductive, theory building process. Ethnographic principles (Lather, 2001) were used to gather multiple forms of rich, descriptive data. The primary data source consists of 66 pre-service teachers' examination papers, in which they critique an ICT case study (Garthwait & Weller, 2005) and reflect on their own classroom experiences with ICT. Additional data was drawn from the ICT case study (Garthwait & Weller, 2005) used in the pre-service teachers' examination, a school handbook (Department of Education, Tasmania, 2005) for primary and high school students studying through an online teaching program, and the researcher's observation journal (Budd, 2008) of the online teaching program.

The detailed reporting of the grounded theory process in chapter three serves the purpose of making as transparent as possible the active, interpretive and conceptual work of the researcher in the identification of the key categories requiring further interrogation. In chapter five, Foucauldian critical discourse analysis (Carabine, 2001) is used to make visible the discursive techniques which enact, reproduce and legitimise unequal power relations.

1.6.3 Findings

Chapter five discusses the findings of the research study in terms of the discursive techniques and strategies of four dominant and interrelated discourses identified in the data. The findings explain the ways in which these discourses work with and against each other to construct pre-service teachers' divergent understandings of the role of ICT in education. Gaps and silences are identified in the data and their significance discussed in term of the ways in which pre-service teachers' pedagogical uncertainties contribute to the troubled and murky waters at the confluence of educational and ICT discourses. The findings make visible the tensions and paradoxes in pre-service teachers' texts, and an account is given for the ways in which these discursive anomalies enable or constrain the development of critical pedagogies.

The findings also bring to light the gaps, tensions and silences in pre-service teachers' discourses about ICT in education as alternative ways of being, knowing and valuing, which are not valued or sanctioned by contemporary educational discourses. Lankshear (1997) explains that a discourse "involves a set of values and viewpoints in terms of

which one must speak and act, otherwise one simply is not in that discourse” (p. 100). This means that gaps and silences in pre-service teachers’ discourses signify potential spaces for new discourses: spaces that require recognition and development through more focused dialogue. While pre-service teachers create these discursive spaces, they are reluctant to acknowledge them and often work to smooth over any discursive irregularities, as there is danger in challenging the discourses of an institution that has the power to promote or demote the professional status of its members.

Although ICT discourses cohere with positivist knowledge frameworks, they sit in tension with critical pedagogies. Pre-service teachers then find themselves accountable for the discrepancies between the ideals and the realities of ICT in education. For the majority of pre-service teachers, who are familiar with popular ICT discourses as students, at home, through friends, films, books, advertising literature, educational software and the Internet, this tension becomes evident when they try to explain the anomalies between the promises of ICT discourses and their experiences with ICT in the classroom.

Discrepancies, anomalies, gaps, silences and tensions in pre-service teacher discourses are discussed in chapter five in order to explicate the ways in which change occurs within and through pedagogical practices, and how the meanings given to words can shift to accommodate the powerful influence of ICT discourses. Lankshear (1997) writes:

Words which have positive connotations and generate strong allegiances across discursive borders are being employed in discursive contexts where projects of willing visions into reality are being enacted. In such contexts there are real dangers of being co-opted into agendas we might subsequently wish we had resisted, but where we could/did not resist because we failed to appreciate the extent to which the meanings of others were not our own meanings; possibly we did not even realise exactly how others with the power to ensure that their meanings prevailed were, in fact, framing what appeared to be shared concepts. (p. 2)

Chapter five discusses the key words and concepts that acquire different meanings as they are informed by contesting epistemological frameworks. These words and concepts, because they construct positive associations between ICT discourses and educational discourses, represent discursive techniques used to draw consensus from pre-service teachers about the role of ICT in education, even though they find themselves disadvantaged by those meanings.

1.7 Conclusion

This chapter has positioned the research with theories that problematise claims to natural, and, therefore, neutral or true representations of the world. Establishing a feminist poststructuralist research framework (Lee, 1992; Weedon, 1987) facilitates an examination of the relationship between technology, literacy and subjectivity and the contradictory politics of changing literacy practices in education. This chapter has also argued the need to reconsider ICT discourses in education in terms of social design rather than the disclosure of an immutable, pre-existing reality. Fundamental ontological and epistemological assumptions have been deconstructed for the purpose of justifying a critical, postpositivist approach to understanding how pre-service teachers come to understand the role of ICT in education.

The following chapter reviews the literature that enables a critique of the epistemic practices that construct the cyborg as a metaphor for human progress and educational practice. It begins with a brief genealogical framework for understanding the various historical constructions of the body as the object of and for pedagogical work, and discusses the effect of ICT practices upon pedagogies as institutionally regulated forms of knowledge production.

Literature review: Nature, knowledge and human progress

2.1 Introduction

In order to develop a critical framework for examining the effects of ICT discourses upon pre-service teachers' pedagogies, this chapter challenges prevailing ICT discourses that inform and legitimise teacher identities and classroom practices. The literature reviewed in this chapter engages with ontological, epistemological and teleological issues, and discusses how ways of being, ways of knowing, and ways of understanding human purpose and progress are constructed at the intersection of ICT and educational discourses. This thesis takes the position that technology is never neutral. It is always implicated in understandings of the body and the world through the construction of the subject within discursive networks of power (Balsamo, 1996; Wajcman, 1991, 2004). Gee (2003) writes:

Language mixes with bodies, things and tools; and the borders that disciplinary experts have created, and which they police, dissolve as we humans go about making and being made by meaning. (p. 13)

Meaning making is always a relational proposition. ICT users, ICT skills and ICT itself are examples of a coming together of a range of discourses about bodies, ways of knowing and ways of constructing the world. For this reason, "the relationship between technological and social change is fundamentally indeterminate" (Wajcman, 1991, p. 163). Consequently, the literature reviewed in this chapter does not provide answers to teleological questions about what the future holds, the purpose of education or the nature of human being and human progress, but engages instead with the mechanisms by which any answer to these questions can be given legitimacy.

Wajcman (1991) argues that "certain kinds of technology are inextricably linked to institutionalised patterns of power and authority" (p. 63). Accordingly, this chapter aims to open up a space in which ICT discourses can be examined for the ways in which they facilitate the construction of new objects and subjects requiring educational intervention. In particular, where ICT skills are linked to new literacies, it is important to understand how ICT, as both "a material and symbolic apparatus" (Braidotti, 2002, para. 2), can re-

shape the development of pre-service teacher pedagogies and work to both enable and constrain teachers' understandings of teaching and learning with ICT.

2.1.1 Chapter overview

2.1.1.1 Genealogy: Examining the production of knowledge

Section 2.2 of this chapter reviews the literature that has led to the acceptance of current rationalities supporting ICT practices in education. The intention is to provide a brief genealogical framework for disrupting “the supposed unity of reason, the subject and history” (Tamboukou, 1999, p. 205), as opposed to “accepting and legitimating what are already the ‘truths’” (Tamboukou, 1999, p. 203) of ICT in education:

Genealogy, as an analysis of descent, is thus situated within the articulation of the body and history. Its task is to expose a body totally imprinted by history and the process of history's destruction of the body. (Foucault, 1984a, p. 83)

Carabine's (2001) Foucauldian genealogical discourse analysis is used in this research to make visible the assumptions that structure and limit ways of thinking and being in the world. Genealogy assists in opening discourses up to examination and critique as it traces the changing history of the body within particular discursive contexts and makes visible the regulatory effects of a discourse in terms of the “conditions under which we might consider certain utterances or propositions to be agreed to be true” (Mills, 2003, p. 25). Genealogy is concerned with “describing the procedures, practices, apparatuses and institutions involved in the production of discourses and knowledges, and their power effects” (Carabine, 2001, p. 276). Feminist, poststructuralist theory and critical discourse analysis cohere with Foucauldian genealogical discourse analysis (Carabine, 2001) as they substantiate claims about the role of discourse in constituting and sustaining unequal power relations through the enacting, reproducing and legitimating practices of dominant groups and institutions.

Section 2.2 demonstrates how diversely located discourses can destabilise the boundaries of the body and establish various systems of subjection. Particular attention is given to the discourse of cybernetics, which is examined to explicate the ways in which new epistemic practices, informed by computer metaphors, construct the posthuman subject (Hayles, 1999a) and inform educational practices. The aim of this macro contextualisation (Carabine, 2001) is to contribute to an understanding of the power/knowledge

relationships that operate in the broader social context within which this research takes place. Genealogy shifts the focus away from the truth, to a focus on the conditions under which one might consider “certain utterances or propositions to be agreed to be true” (Mills, 2003, p. 25). In this respect, incorporating a genealogical element in educational research can empower and encourage teachers and students to shape their own social futures and to engage with progress on their own terms.

2.1.1.2 De/constructing agency in cyberspace

Section 2.3 discusses the contesting discourses that complicate pre-service teachers’ understandings of the role of ICT in education. The section begins with a discussion of Hayles’ (1999a) account of the posthuman, which is then extended to explicate the paradoxical conditions for effective participation in the new social domain of cyberspace. This serves the purpose of identifying any shift in hegemonic patterns of power and authority, and explains the complex and often contradictory effects of ICT discourses on pre-service teachers’ developing pedagogies.

Foucault (1982) writes that one way to analyse the power effects of a specific rationality is through the “antagonism of strategies” (p. 780). Accordingly, section 2.3 engages with the contesting perspectives and contradictory politics that inform not only the construction of teaching and learning subjectivities in cyberspace, but also their literacy practices. In order to foreground issues of agency and ethics, section 2.3 takes up a critical stance and problematises the increased technologisation and dislocation of corporealities in electronic social networks where the knowing subject is no longer discursively bound to a unique corporeal perspective.

2.2 ICT and progress: Designing bodies

This section of the literature review chapter examines how understandings of nature, knowledge and human progress are produced and reconfigured through a range of discursive traditions. In particular, the cyborg metaphor and Hayles’ (1999a) account of posthuman theory, both representing the more specialised computer discourses of cybernetics and informatics, are examined here to demonstrate the discursive techniques and strategies that construct humans and computers as highly compatible, intelligent systems. The intention is to facilitate an understanding of the ways in which computer

metaphors can change the way pre-service teachers think and talk about the capacities and potential of bodies and the relevance of ICT in education in the digital age. A genealogical framework serves the purpose of making visible, de-naturalising and critiquing posthuman teleologies as they are constructed through ICT discourses and as they inform notions of evolution, emancipation and technological progress, and more particularly, the role of ICT in education.

2.2.1 Metaphors: Establishing discursive alliances

Renshaw (2003) acknowledges that certain metaphors find “favour and a receptive audience” (p. 362) at particular points in time and this thesis argues that the cyborg metaphor is a symbol of human potential in the computer age. Borer (2006) presents the cyborg as an elucidation of “the interdependent relationship between humanity and technology” (para. 4). The cyborg is a cybernetic organism, representing the symbiotic relationship between humans and machines, the reconfiguration of ontological human/machine boundaries, and new understandings of human potential.

Metaphors facilitate a conceptual shift by functioning as a hybrid text that “merges semantic fields into a new entity” (Heuser, 2003, p. 215). Gerovitch (2002) demonstrates how cyborg metaphors blur biological and technological domains of knowledge practices, writing:

Cyberneticians took such common physiological and psychological concepts as *memory*, *homeostasis*, and *purpose*, and extended them into the realm of machines. Physiologists, on the other hand, took such concepts as *information*, *programming*, and *feedback* out of their technical context, and applied them to living organisms. (p. 340)

The increased ambiguity of meaning-making processes through the use of metaphors points to the subversive potential of texts. Metaphors draw together what might otherwise be incommensurable realities (Lyotard, 1984), such as the city as a jungle or the body as a machine. New metaphors instantiate new relationships and, therefore, are “not merely decorative so much as indispensable to the creation of new meaning” (Heuser, 2003, p. xli). Metaphors, depending on the context of their use, can operate not only to stabilise meaning but also to facilitate a shift in perspective. Burbules (1997) explains that:

metaphor is a comparison, an equation, between apparently dissimilar objects, inviting the listener or reader to see points of similarity

between them while also inviting a change in the originally related concepts by “carrying over” previously unrelated characteristics from one to the other. (p. 111)

ICT discourses are powerfully informed by the cybernetic paradigm, where “the root metaphors are information processing and automaticity” (Heffron, 1995, p. 500). This is significant for understanding the impact of ICT discourses on educational practice and illuminating the textual nature of scientific work. Hodas (2006) writes that “each shift to a new metaphor drastically affects the way cultures view the natural and human worlds” (p. 203). This thesis argues, therefore, that discourses that construct real life as just another window (Turkle, 1995), or compare artificial intelligence to human intelligence (Wiener, 1967), have important implications for the way pre-service teachers prepare for and understand ICT practices in education.

2.2.2 Changing discourses: Changing bodies

Different discourses rationalise and legitimise various configurations of the human body and inform what it means to be human. Accordingly, depending on the discourse, various human attributes such as intelligence, creativity and interactivity can also take on different meanings (Capra, 1996). Furthermore, technologies are products of mutual discursive alliances and the shaping of their use and purpose reveals “continuities of power and exclusion” (Wajcman, 2004, p. 54). Consequently, identifying a discourse does not establish an underlying truth about human nature, but serves instead to identify how privileged and marginalised subjectivities are constructed and maintained by the discourse.

The following examples of various discursive constructions of the category human demonstrate why notions of human nature, human progress and human potential are problematic. Once deemed to be made in the likeness of gods, understandings of what it means to be human have been destabilised not only by the monsters, and cyborgs of science fiction, but also by the discourses of science. Palaeoanthropology and evolutionary theory raise the question of how far back in the evolutionary past the category of human can be applied. The social sciences’ cultural models of the category human are undermined by creatures such as bees, ants and chimpanzees, which are able to work together as a community, demonstrate communicative behaviours, and evince fewer antisocial tendencies than humans. Evolutionary models of human being that locate humans in an animal continuum, or identify “degenerate groups of humans” (Fernandez-

Armesto, 2004, p. 84) are also complicated by the availability of chemical substances and medical procedures that can alter physical development, physical performance and mental states.

Genetics has even made the definition of human being quantifiable by identifying, measuring and comparing genomes. It is, therefore, interesting to note that humans share 95 percent of their genomes with chimpanzees: “a barely significant difference” (Fernandez-Armesto, 2004, p. 147). To problematise the genetic argument further, Fukuyama (2002) explains that “genes interact with environment at virtually every level of an organism’s development and therefore determine much less than is usually asserted by proponents of the concept of human nature” (p. 134). In addition, the use of animals for medical research demonstrates the biological “continuities between humans and other animals” (Fernandez-Armesto, 2004, p. 62).

Any transition from the category pre-human to human, or human to posthuman, or from one discourse to another, does not reflect a truth about human nature, but instead demonstrates how various internally coherent signifying systems can regulate the production of subjectivities and construct normative points of view. Teachers, drawing from a range of discourses, implicitly communicate understandings of what it means to be human when they decide what and how to teach. The following section examines the implications of discourses from the sciences of informatics and cybernetics for pre-service teachers’ understandings of the body.

2.2.3 Cybernetics: Constructing the cyborg/posthuman

Hayles’ (1999a) account of the posthuman examines the effect of the cyborg metaphor and ICT discourses, in terms of constructing the body’s deficiencies and potentialities. Her discussion of the posthuman is useful for making visible the ways in which new discourses enable and promote ways of being and new literacy practices. Hayles (1999a) argues that computer discourses marginalise embodiment as a suspect interface between the self and the world. The body is presented as an unreliable node in an information loop which consists of hardware, software and wetware, otherwise known as the physical technology, the program and bodies. Hayles (1999a) explains that the posthuman, as articulated through the use of cyborg metaphors, signifies the increased dissolution of the body through “the violation of the human/machine distinction” (p.84).

Informed by theories drawn from cybernetics and informatics, posthuman discourses construct intelligence, consciousness and life as amorphous concepts dispersed across the new holy trinity of hardware, software and wetware, “where no one person or thing is doing the thinking” (Heffron, 1995, p. 497). Intelligence, consciousness and life are merely by-products of the information system, and the body, as wetware, is constructed as the leaky and, therefore, suspect interface.

The educational significance of this claim is discussed here in relation to new understandings of human purpose and potential. Increasing emphasis on ICT literacies promote the posthuman subject in the collective imagination and endorse the related subject positions that enact the posthuman worldview. The result is an unquestioning acceptance of the new “spatial ontology” (Lankshear et al., 2000, p. 18) of the Internet which constructs the posthuman (Hayles, 1999a) as a disembodied subject, able to experience the world and alternative realities through the non-space of electronic networks. Hayles (1999a) summarises the posthuman condition as follows:

In the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals. (p. 2-3)

If computer metaphors construct the posthuman as just another node in the flow of information (Hayles, 1999a), then providing students with access to ICT can reasonably be argued to be an educational imperative. Pedagogies that support and promote ICT use are consistent with a posthuman worldview because the science of cybernetics foregrounds the informational continuities between humans and other self-organising systems such as machines so that interfacing students with ICT would immediately represent an improvement in their information storage and processing capacities. In educational contexts, therefore, cybernetic discourses represent “the most sophisticated in a long line of efforts to discipline and rationalize the learning process” (Heffron, 1995, p. 499).

The current definition of the term cybernetics is “the science of communications and automatic control systems in both machines and living things” (Moore, 2004). In 1948, Wiener (1967) published the first book that used the term cybernetics, which, derived from the Greek word *kubernetes*, means steersman. Wiener’s (1967) work applies the

interrelated principles of information, feedback and control in engineering, to other systems in general, including systems of living organisms, abstract intelligent processes, and language. Classing communication and control together, Wiener (1967) suggests that the ability to improve the flow of information between machines, and between man and machine will be increasingly important for human progress:

We have modified our environment so radically that we must now modify ourselves in order to exist in this new environment. (p. 66)

Theories of informatics and the posthuman engage with ontological and epistemological issues when they problematise the boundaries of the body. Wiener (1961) demonstrates his engagement with such issues when he writes, “there is much in the social habits of a people which is dispersed and distorted by the mere act of making inquiries about it” (p. 163). The outer surface of the skin, once indisputably containing the extremities of the human subject, has been discursively reconceptualised as thoroughly intermeshed with and constituted by the objects it encounters and this is demonstrated by Merleau-Ponty’s (1962) argument that a blind man’s cane acts as a medium for perception and, therefore, constitutes an extension of the body. Hayles (2006a) elaborates on this argument, explaining that, “cybernetic systems are constituted by flows of information. From this viewpoint cane and man join in a single system, for the cane funnels to the man essential information about his environment” (p. 1).

Wiener (1967) was a central figure in early debates about the nature of artificial intelligence, writing:

Theoretically, if we could build a machine whose mechanical structure duplicated human physiology, then we could have a machine whose intellectual capacities would duplicate those of human beings. (p. 80)

The lack of success of the original artificial intelligence paradigm, however, led to a shift of interest from observed systems to observing systems: from conceptualising a machine with human intelligence to defining and understanding human intelligence, function and potential within a mechanistic paradigm. Using a computational model, the new cybernetic paradigm was represented by Minsky’s (1985) claim that:

any brain, machine, or other thing that has a mind must be composed of smaller things that cannot think at all.... Are minds machines? Of that I’ve raised no doubt at all but have only asked, what kind of machines? (p. 322)

Beginning with Wiener's (1967) vision of a science for developing intelligent machines, posthuman discourses have reshaped understandings of concepts such as human, intelligence and life. These new discursive frameworks support the view that the significance of a body lies in its informational patterns and processes rather than its corporeality. Wiener (1967) problematises the nature of embodiment, which is "always fighting nature's tendency to degrade the organized and to destroy the meaningful" (p. 26). Wiener's (1961, 1967) cybernetic discourse reconfigures and reduces the human body to a simulacrum for the machine and a simulation of technological progress, and in so doing, "radically destabilizes the ontological foundations of what counts as human" (Hayles, 1999a, p. 24) by "collapsing the natural, social, and biological sciences into a single enterprise and laying the putative foundation for a unified theory of human and machine processes" (Heffron, 1995, p. 499).

Consequently, this thesis refers to cyborg discourses as representing a "reconception of the subject that situates the human and the technological as coextensive, codependent, and mutually defining" (Bukatman, 1993, p. 22). The boundary between human and non-human entities is indeterminate and the cyborg is symbolic of the technologised beings designed to inhabit new electronic spaces. The cyborg represents the "leaky" (Haraway, 1991, p. 152) and liminal interface between nature and culture, the biological and the technological, the self and the other.

Cyberspace might be populated by cyborgs, but experiences in cyberspace provide a mirror for embodied spaces (Myers, 2001) by reflecting the desires and needs of embodied participants. Digital discourses construct cyberspace as a mythical and liberatory space, one in which there is no need to disclose gender, race, socio-economic status or body shape. In this mythical space, experimentation does not endanger the embodied subject, as embodiment has been reduced to a distant and spectral entity. Cyborgs, transformed and enhanced by technology, can live out their wildest fantasies. They can create new bodies and identities, engage in new and often illicit relationships, explore and create their own imaginary worlds, engage in dangerous battles, die and be born again.

This thesis argues that, while embodiment is marginalised in narratives of cyberspace, it remains the central site for meaning making:

Theories ... that describe and interpret online social activity as if cyberspace were a radically other realm, tend to lose sight of the empirical fact that there are living, breathing human beings behind the avatars in cyberspace. (Borer, 2006, para. 4)

For many computer users who experience physical or mental stress as a result of repetitive strain injuries, sore backs, obesity or isolation, or are the victims of bullying, flaming or sexual predators, the denigration of embodiment in digital narratives has the paradoxical effect of justifying an increased symbiosis with technology. Repairing and augmenting the failing body with new technologies has now become an accepted norm. The body is increasingly constructed as the unfinished project of scientific discourses. Breast implants, stomach stapling, face-lifts and chemical alterations to enhance the performance of the body are now welcomed as necessary interventions in what is constructed as a degenerate and vulnerable biological system.

Feminists such as Haraway (1991) and Plant (1997) have recognised the potential of the cyborg metaphor for deconstructing gender. They claim that cybernetic discourses can support feminist agendas by redefining gender as a manipulable program, rather than an immutable human condition. This thesis, however, supports Hayles' (1999a) and Balsamo's (1999) argument that "the new cannot be spoken except in relation to the old" (Hayles, 1999a, p. 158), hence "the notion of human relies upon an understanding of non-human" (Balsamo, 1999, p. 147), just as the notion of male relies upon an understanding of female. Consequently, the "dominant representation of cyborgs reinserts us into the dominant ideology" (Balsamo, 1999, p. 154), with all the pre-established binaries that inform the nature of gendered subjectivities and social power relations. Spender (1995) demonstrates the irony of cyberspace politics when she discusses a case of data rape, where a sexual assault was described on an online multi-user game site:

Some of the women involved wanted the culprit to be put off the net (toaded). But this went against the principles of those who were determined to defend free speech in cyberspace. (p. 207)

The popular argument, "if you don't want to watch what's on, *then turn it off!*" (Spender, 1995, p. 207), means that free speech in online forums, which includes sexual harassment, pornographic imagery, flaming and cyber-bullying can result in the exclusion of some groups and individuals from equal participation.

In this way, posthuman discourses, which promote the discursive disintegration of the body through the use of human-machine metaphors such as: “the brain is a digital computer ... the mind is a universal logical machine ... human communication is transmission of information ... thinking is computation” (Gerovitch, 2002, p. 340), perpetuate hegemonic relations. These metaphors operate to dissect, disperse and radically de-centre corporealities, thereby maintaining and promoting the fictional narrative of the normative body and objective science, while at the same time justifying the increased technologisation and regulation of gendered bodies. Consequently it appears quite appropriate for Wiener (1967) to declare that, “the mechanical fluidity of the human being provides for *his* [italics added] almost indefinite intellectual expansion” (p.80).

The cyborg, as both “technological artifact and cultural icon” (Hayles, 1999a, p. 2) has developed along with the computer industry to enact the modernist fantasy of augmenting the power and control of human beings over the perceived deficiencies of nature. This represents a continuation of modernist and liberal humanist agendas through the increased separation of the mind/body relationship and the dislocation of knowledge from embodied contexts:

The cyborg is also the awful apocalyptic *telos* of the “West’s escalating dominations of abstract individuation, an ultimate self untied at last from all dependency, a man in space”. (Haraway, 1991, p. 150)

The posthuman is constructed as the culminating performance of informational patterns and Escobar (2000) argues that even “Foucault’s elaboration of the nature of discursive formations can likewise be seen as a theory of the self-organizing character of knowledge systems” (p. 70). Escobar argues that normative discourses are simply informational patterns which establish a system of relationships out of which embodied consciousness, as a by-product, emerges. Conflating discourse with information undermines the relevance of embodiment as the site around which information is imbued with meaning to construct unique subjectivities within relationships of power.

The posthuman represents a discursive reconfiguration of the body so that processes of life and intelligence can be reconceptualised as informational patterns of self-organising systems. Informed by Wiener (1967), Moravec (1988) argues that the body, which is replaced over time via the constant replication of cells, is a by-product of individual cellular processes. Each cell is a self-organising system, reproducing and enacting its

function, which is to maintain its integrity as a self-organising system. The body, having undergone “prostheticization, augmentation, cyborgization” (Bell, 2000, p. 5) is deemphasised in posthuman discourse as a mere conduit for informational flows so that being wired to the electronic network represents a natural enhancement and another step in human evolution. This point is demonstrated in Wiener’s (1967) statement that “language is not exclusively an attribute of living beings but one which they may share to a certain degree with the machines man has constructed” (p. 101). For Wiener in particular, the cyborg signifies the potential reconfiguration of the boundaries of the body “so that it can be seamlessly articulated with intelligent machines” (Hayles, 1999a, p. 3). In this way, the body is remade into the likeness of its own technologies.

Posthuman discourses do not support the development of critical pedagogies because they undermine the significance of embodiment for disrupting and contesting established norms. Nor do posthuman discourses acknowledge that they may be implicated in the marginalisation of some groups and perpetuate oppressive realities. Educational discourses, in promising social mobility through changing and improving students’ potential through new ICT literacies, require that corporealities, as uniquely embodied and located subjectivities, adapt to institutional discourses or be deemed deficient in some way:

Education as assimilation means getting into institutionalized education and succeeding at it by crossing over, and by making yourself over in the process. (Cope & Kalantzis, 2000, p. 123)

Pedagogy is a political practice that “turns on the ability of the nascent subject to change, to alter, to become something other than what it was” (Todd, 2001, p. 432), to become “more than their present selves” (Todd, 2001, p. 436). Critical pedagogies, however, take into consideration “what is ethically at stake in asking students to learn” (Todd, 2001, p. 431) by reframing the knowledges produced through pedagogical encounters within historically contingent cultural practices.

Tamboukou (1999) writes that “there are no final ‘truths’ about our nature” (p. 208). Genealogy, therefore, “must record the singularity of events outside of any monotonous finality” (Foucault, 1984a, p. 76) and reject teleological views of history and human progress:

Calling into question self-evidences of the present by exposing the various ways they were constructed in the past, such histories shatter certain stabilities and help us detach ourselves from our “truths” and seek alternative ways of existence.... There is no truth but truths, no reason by rationalities, no knowledge but knowledges of the ways people have come to understand themselves and the world. (Tamboukou, 1999, pp. 210-211)

In discussing the discursive processes that construct nature, knowledge and human progress, there are three important points to be made. Firstly, change occurs discursively. This is significant, because this thesis argues that the introduction of ICT in education has promoted the use of digital metaphors, which act “as threshold devices, smoothing the transition between one conceptual constellation and another” (Hayles, 1999a, p. 17), merging with and changing discursive regimes of truth.

Secondly, change occurs through what Hayles (1999a) refers to as a symbiotic process: a relationship of mutual benefit or dependence. One discourse does not exist separately from another, but both are made possible by the continuously evolving narrative of human experience, so that the meanings derived from one text are dependant upon the reader’s knowledge of prior texts and their meaning making conventions. The concept of symbiosis, therefore, is significant for undermining binary structures, by referring to the interdependency of things and processes, objects and subjects, reality and corporeality, the body and embodiment, the self and the other, the universal and the specific.

Finally and most importantly, symbiosis, a concept represented by the cyborg metaphor, represents agency. Although the point has been made that identity is subject to the mutually constitutive processes of discursive and cultural change, it is equally important to acknowledge the subject as being deeply implicated in cultural processes through compliance or resistance to discursive regimes. Symbiosis, therefore, means that we are not only regulated by change, we are also the agents for change.

2.3 Human progress: Determining agency

This section of the literature review discusses the relationship between nature knowledge and human progress, in order to develop a critical framework that can account for pre-service teachers’ wide-ranging, diverse and often contradictory understandings of ICT practices in education. The aim is to “look more closely at the workings of those practices

in which moral norms and truths about ourselves have been constructed” (Tamboukou, 1999, p. 208).

Feminist theories acknowledge the importance of peripheral histories and subjugated knowledges, thereby supporting the development of critical pedagogies, which foreground issues of social justice and examine the politics of knowledge production. For this reason, the literature reviewed in this section problematises ICT discourses that promote the disintegration of individual corporealities and maintain hegemonic systems of control. These discursive techniques and strategies are discussed in terms of how they support the continuation of liberal humanist regimes of truth, make invisible a range of oppressive realities, and authorise vast differences in the distribution of power and wealth.

What is being called into question in this final section of the literature review is not the nature of the human subject, but the conditions for its participation in the new social domain of cyberspace. While the previous section explains how cybernetic discourses construct and privilege the disembodied subject, thereby rendering individual corporealities optional and controllable modes of being, this section argues that embodiment remains indispensable for meaning-making and agency. Corporealities, as embodied subjectivities represent sites of difference that resist and contest the white, middle-class male experience (Foster, 1999) represented by contemporary hegemonic rationalities.

Digital discourses are increasingly being used in education to promote new literacy practices as new ways of being and knowing. To understand how teachers develop their understandings of ICT practices in education it is important to investigate the broader social discourses that construct the culture of ICT use. Embodiment and the construction of subjectivity and difference in relation to the new and powerful discourses and metaphors emerging from the computer industry, are discussed in this section in order to make visible and problematise the kinds of human beings that ICT discourses engender. The literature reviewed here demonstrates how ICT discourses contribute to the construction of the posthuman by examining “the emergence of a norm over the level of functional fluctuations” (Foucault, 1970, p. 359), where the posthuman norm is an effect of ICT discourses, and the functional fluctuations are effects of corporealities.

Pedagogy represents a “moral vision” (Simon, as cited in Todd, 2001, p. 436) that constructs learners’ subjectivity and social potential and aims to develop students into more, or other, than what they currently are. Consequently, to identify any gaps, silences, tensions and contradictions in pre-service teachers’ understandings of the role of ICT in education, it is important to examine the paradoxes produced through the juxtaposition of posthuman and corporeal perspectives of ICT practices. These paradoxes represent antagonistic rationalities (Foucault, 1970) as they relate to issues of agency and ethical relations in cyberspace. They are discussed here because they represent the contesting discourses that not only inform, but also complicate and undermine, teachers’ understandings of ICT practices in education.

The paradoxical relationships presented by the literature reviewed in this section facilitate an understanding of how ICT discourses inform the construction of subjectivities in terms of, for example, being literate or illiterate, being an effective teacher or an ineffective teacher. This follows Foucault’s (1982) recommendation that, to understand what is gained through new language practices it is important to understand what knowledges are subjugated. Accordingly, to understand what is meant by ICT literacy in the digital age, it is important to investigate the construction of the newly illiterate. The critical framework presented in this chapter, therefore, does not point to a truth about pre-service teachers’ pedagogies or their ICT practices, but provides, instead, an alternative reading of the effects of ICT discourses that operate to the advantage of some corporealities and the marginalisation of others.

2.3.1 Cyborg futures: Empowerment or control?

The teleological assumptions, implicit in posthuman discourses, promote the cyborg as a symbol of human potential. Technology is constructed as a transcendent force to which all things must respond and adapt, rather than an effect of contemporary socio-political relations. Millar (2000) writes:

The theme of limitless faith in technological progress and the association of technology with religious transcendence is one of digital ideology’s most important myths. (p. 135)

Technological determinism reverses the biological/technological binary to privilege technology, suggesting that human progress is linked to technological processes, and once again obscuring the importance of embodiment. One effect of determinist discourses is the

abdication of responsibility. If technology determines human being, and if technology is godlike in its omnipresence and regulating effects, then humans cannot be held responsible for the outcomes of technological progress. Postman (1992) argues that such a discourse:

depends on our believing that we are at our best when acting like machines, and that in significant ways machines may be trusted to act as our surrogates. Among the implications of these beliefs is a loss of confidence in human judgment and subjectivity. (p. 118)

Freedom in this context refers to the abdication of responsibility and is therefore tempered with a loss of control.

The desire to augment the body's capacities through the application of powerful technologies demonstrates "the concomitant fear of a loss of power and the weakening of human control" (Bukatman, 1993, p. 5). Associated with the abdication of responsibility and loss of control are the anxieties brought about by the passivity, powerlessness and vulnerability of bodies. Anxiety about "technology's capacity to consume us" (Lupton, 2000, p. 484), or at least, replace many workers, is the outcome of society's growing dependency on computers and the enforced passivity and compliance of bodies in the digital age.

Dominant discourses bring together and appropriate a range of discursive techniques. They construct "causal relations, sequentiality, the teleological satisfaction of an ending, a final steady state through which all other elements will retroactively assume a full significance" (Bukatman, 1993, p. 106) so that the discursive gaps and anomalies produced by a range of disparate texts are made invisible. Long-term outcomes of scientific endeavours remain ambiguous, however, as "we are no longer sure whether science and technology are the solution to the world's problems ... or the cause of them" (Wajcman, 2004, p. 2).

Not only a great deal of good, but also a great deal of harm has been done on both a local and global scale in the name of progress, including environmental pollution, global warming and depletion of the ozone layer, rising rates of obesity, cancer and heart disease as a result of new chemicals and food additives, the production of addictive substances, nuclear and chemical weaponry, and car accidents. At the same time, in some parts of the world, people are still dying for want of a clean water supply. This suggests that what

constitutes progress depends on the embodied specificities of who you are, where you live and the lifestyle and services you can afford.

Posthuman discourses eliminate alternative ways of being and knowing by making the body less visible. Locating agency and establishing ethical social relationships is problematic when the self is dispersed across a network of self-referential and circular discourses. Consequently, for the posthuman, education is about accessing and disseminating information, rather than exploring the interpretive resources represented by uniquely embodied students. Postman (1992) writes:

The computer redefines humans as “information processors” and nature itself as information to be processed. The fundamental metaphorical message of the computer, in short, is that we are machines. (p. 111)

Hayles (1996) explains that “underlying the idea of cyberspace is a fundamental shift in the premises of what constitutes reality. Reality is considered to be formed not primarily from matter or energy but from information” (p. 112). The cybernetic paradigm therefore, in promoting the endless circulation of information with complete disregard for the various materialities or corporealities through which information is instantiated and given meaning, undermines the importance of embodiment as the site of meaning and change, and idealises the dispersal of the self as data.

2.3.2 Symbiosis: Continuities and discontinuities

Pedagogy is concerned with the construction of productive and cohesive social identities and the construction of subjectivities in cyberspace adds a complex dimension to teachers' work. Disembodied subjectivities are concurrently empowered and disempowered and discourses of continuities and discontinuities exist in a paradoxical relationship. Embodied and finite subjectivities construct resistance and ambiguities. Like cultural narratives and literacy practices, cyberspace elides and smoothes over corporeal resistance by foregrounding the normative, disembodied subject. In the non-space of the World Wide Web, the disembodied subject is free from corporeal resistance, empowered, but also dependant upon the continuity and connectivity of electronic networks.

Rabkin (1996) explains that “we like to think of ourselves as continuous” (p. xiii). Fundamental to concepts of independence and autonomy is the maintenance and

surveillance of the body's boundaries. Like the boundaries of the body, however, the continuity of the body is also questionable. The anecdote of a farmer, who declares that he has had the same axe for twenty years, during which time he has replaced the handle three times and head once provides a useful analogy. The question to be asked is whether or not it is the same axe. Similarly it is possible to question the continuity of the human subject within medical discourses which promote the alteration or substitution of body parts and confirm the short life span of the body's cells, all of which are replaced over time. It is ironic, therefore, that the cyborg metaphor alleviates anxieties about the disintegration of bodies that "eat, drink, cry, sweat, urinate, defecate, menstruate, ejaculate" (Cavallaro, 2000, p. 47) by presenting a "clean, hard, tightness of form" (Lupton, 2000, p. 480), while at the same time dismantling the liberal humanist subject and "offering no clear-cut division between communication processes in machines and in humans" (Heffron, 1995, p. 501).

Bukataman (1993) believes it is the role of science fiction to "repeatedly narrate a new subject that can somehow directly interface with – and master – the cybernetic technologies of the Information Age" (p. 2). Popular films such as *The Matrix* (Wachowski & Wachowski, 1999), for example, construct seductive, parallel realities, where the body is both the source of physical desire and also a figment of its own imagination. *The Matrix* (Wachowski & Wachowski, 1999) problematises reality by suggesting that the subject enters the fictional space of the matrix at the same time that the matrix constructs the fictional space of bodies. The main protagonist Neo, for example, is portrayed as both digital construct and omniscient controller of the computer code: both mortal and contained as embodied identity, and immortal and liberated as a flow of data. In this way, new technologies and their associated discourses can re-inform the human condition and "change what we mean by knowing and truth; they alter those deeply embedded habits of thought which give to a culture its sense of what the world is like" (Postman, 1992, p. 12).

The concept of continuity and discontinuity with respect to the self is especially problematic when the need arises to defend the body. If bodies end at the skin, then interfacing with a machine does not augment the body and any virus a machine has does not endanger the body. If, however, corporeality is the sum of information that flows between the body and the world, then the boundaries of the body remain undefined and

unprotected and a computer virus can threaten its capacity to operate effectively in the world. The cyborg metaphor, therefore, “simultaneously empowers the physical being and curtails its materiality, consolidates its boundaries and opens it to alien incursions” (Cavallaro, 2000, p. 54). Unwanted emails and text messages, cyber-bullying and video sharing websites such as YouTube conflate public with private and construct the individual as available for contact 24 hours a day, seven days a week.

Shaviro (1995) claims all languages are a form of viral infection, invading and appropriating the world and “we all have parasites inhabiting our bodies; even as we are ourselves parasites feeding on larger structures” (p. 43). Even subjectivity can be understood to be a “symptom of parasitic invasion, the expression within me of forces originating from the outside” (Halberstam & Livingston, 1995, p. viii). The cyborg, as humans’ evolutionary successor, promotes the erasure of embodiment as a means of adapting to an irrevocably altered environment of the future. The prospect of new electronic spaces for social interaction shifts the focus from the possibility of cyborg modifications to the question of “whether unmodified humans could continue to exist” (Hayles, 1999a, p. 169).

Wiener’s (1961, 1967) claim that all purposeful behaviour requires negative feedback, constructs the primary function of human being as the detection of error, making it possible for cognitive scientists working in education, Resnick and Johnson (1988), to write that “children must be taught to *routinely* monitor themselves for bugs” (p. 152). In this context, education is not about enabling purposeful design, but about ensuring an appropriate, reactive response: an internal adjustment that allows an adaptation to hostile environments in order to re-establish some form of equilibrium. While this coheres with behaviourist theories of education, it does not facilitate the development of critical pedagogies and critical theories of education, which examine “how our invested positionality shapes our rhetoric and practice” (Lather, 1991b, p. xvii).

Determinist discourses make it easy to forget that “a robot’s goals and purposes are not intrinsic to it but are ultimately explicable in terms of human purposes” (Boden, 1995, p. 69). Determinist discourses undermine individual agency by eliding the significance of embodiment as the very site of and for the production of technologies and, therefore, of agency. Balsamo (1996) writes:

Although technologies have no agency in themselves, embodied engagement with, and use of technologies produce a range of cultural effects. When discussing new technologies, it is important to try to avoid the trope of technological determinism that argues that these technologies necessarily and unilaterally expand the hegemonic control by a techno-elite. Technologies have limited agency. (p. 123)

Making visible the disempowering effects of determinist discourses calls attention to the political effect technologies have upon the production of corporealities as knowing subjects. Haraway (1991) explains that the cyborg represents “a historical system depending upon structured relations among people” (p. 165) and structured relations are informed by “the interaction between bodies and technologies” (Wahl, 1993, p. 2). In education, new technologies not only establish new literacy practices but also re-define the literate subject. Consequently, promoting ICT as a key literacy opens up the possibility that “today’s corporate software designers can easily become the literacy and pedagogy experts of tomorrow” (Luke, 2000, p. 71).

2.3.3 The new frontier: Uncharted territory or already mapped?

Pre-service teachers draw on a range of discursive techniques to legitimise their teacher identities and classroom practices with ICT. Constructing the Internet as a new frontier is one such technique. This section examines the paradox of the Internet as both an uncharted and liberating frontier, and an already mapped and regulated territory. The invisibility of participants in the predominantly text based public sphere of cyberspace makes it possible to promote the non-space of computer networks as the new frontier. Frontiers are about exploration, expansion, and the subjugation of new spaces and new bodies:

It is, as the celebrated cliché has it, the last frontier, which ties in with what one does in frontiers of all kinds – meeting the “other”.
(Westfahl, 2000, p. 15)

Anyone entering the digital domain in search of a liberating space, however, will be disappointed. The vistas offered in cyberspace are always already mapped and encoded by the people who control the language of cyberspace: the designers of computer software and hardware. For the majority of users, nothing exists online if it is outside the parameters of the search engines provided. Furthermore, Bigum and Green (1992) argue that:

the computer, which 'reads' and 'writes' with such exact and reproducible precision, is obviously a congenial mechanism for the teaching of reading and writing 'skills', as well as an exemplary concept-metaphor for an educational culture in search of certainty and salvation. (p. 10)

ICT use promotes conformity to the conventions and regulations which the dominant players in cyberspace deem to be legitimate textual practices. To forget a dot or a forward slash as part of email or programming protocols, for example, can result in being denied connectivity altogether. In this respect, a potentially liberating space can become claustrophobic and highly exclusive as a result of its demand for textual compliance.

The mapping of culture in cyberspace, like the chronicling of human events and relations, represents an attempt to impose political order upon the world and the closing off of possibilities rather than an opening up of new spaces for new ways of being. Similarly, the Internet represents both the map and the uncharted territory, as the language of the Internet, being predominantly in English, enacts a colonising process, applying pre-established cultural practices upon new social spaces.

Kolko, Nakamura and Rodman (2000) express their concern that currently, the wealthiest and most influential participants in cyberspace are American corporations. They argue that the language of the Internet promotes a radical marketisation of public services. Fairclough (2008) provides the example of school websites taking up the genres developed by business organisations to promote their services, thus constructing students and parents as prospective clients or customers. This new relationship undermines the integrity of curriculum design and the purpose of teacher pedagogy. Fairclough (2008) asks how an educational institution is able to "maintain control over its own processes and procedures when it is trying to sell them to consumers on a market?" (p. 164).

Holmes (1997) writes, "The Internet ultimately becomes a fabulous system of self-referentiality, an illusion of totality, which is nevertheless a totality with every chance of success precisely because it never has to go beyond itself" (p. 15). As language practices privilege some subject positions and marginalise others, new literacies, such as ICT literacy, represent an opportunity for establishing new social relationships and new networks of power. Unfortunately, discursively reconfiguring the body through the use of cyborg metaphors in order to accommodate and promote new social domains such as

cyberspace, has so far worked to consolidate the pre-existing relations of sex, class, race and age that determine access to social resources.

2.3.4 Disembodied but gender focused

Constructing the disembodied domain of cyberspace as a safe and liberatory space for experimenting with new subjectivities is another powerful ICT discourse that can inform pre-service teachers' understandings of ICT in education. This thesis argues, however, that ICT literacies are inequitably gendered. A notable irony of social relations in disembodied spaces, therefore, is the increased dependency on, and reproduction of gendered stereotypes. The normative body in cyberspace is white, male, speaks English, is well educated and has access to sufficient funds for constantly upgrading equipment. The male body, as a normative myth, is served well by technology. Millar (2000) writes "In cyberspace, a technologically determined heaven or digital nirvana, inhabited by disembodied male computer wizards, becomes a very real possibility" (p. 140). Women, on the other hand, are "conspicuous by their absence" (Sardar, 2000, p. 740). Women, as a minority group in Internet chat rooms and role-playing games, are not only the subjects for sexual predation but also carry the burden of constantly having to authenticate their gender. The effect of the hegemonic domination of cyberspace is that "gendered identities are upheld rather than unraveled" (Williams, 1998, p. 130). Spender (1995) writes:

Sexual harassment has often been referred to as the systematic means of keeping women out of male territory, and this is certainly how it works in cyberspace. Young women who are distressed by the face-to-face behaviour of males in classrooms and computer labs, and who are shocked to the core by their early experiences on the net, aren't going to be keen to become the computer whizzes of the twenty-first century. This is why sexual harassment should be seen for what it is: the "terrorist" tactic used by some men to drive women away from the centre of wealth and power. (p. 203)

Racial and gendered stereotypes abound in the new textual arena of cyberspace, because bodies that don't fit the normative discourse remain invisible. This is especially the case for sick, disabled, poor and homeless bodies.

Furthermore, the phenomenal increase in pornographic images on the Internet suggests that male, utopian fantasies underpin and shape the virtual communities of cyberspace and "represent a desire to escape the conditions and problems of the present world, rather than an attempt to alter them" (Cooper, 1997, p. 95). In this respect, cyberspace, as the new

frontier, offers an element of lawlessness. Flaming is rife in this public arena, as perpetrators are ensured a high level of anonymity and disengagement from the long-term affects of embodied social relations.

As a male dominated, public sphere, cyberspace is experienced very differently by women, who are frequently subjected to various forms of harassment (Spender, 1995). Although feminists such as Haraway (1991), Millar (2000) and Plant (1997) are optimistic about the potential of cyberspace for subverting existing gender constructs and providing a voice for marginalised groups, Spender (1995), however, acknowledges that even women's forums are dominated by men "querying, correcting and attacking the terms and priorities of these women-organised bulletin boards" (p. 237).

In disembodied spaces, social relations are more powerfully informed by language practices that construct, gender, ethnicity, race, socio-economic background and disability. These language practices not only affect access to the social networks of cyberspace, but also impact upon the nature of face-to-face emotional experiences (Williams, 1998, p. 120). Absence of difference, for example, enabled through the predominantly hegemonic discourses of online networks, decreases tolerance for the differences and ambiguities represented by embodiment. Being wired to electronic networks changes social relations. It is now considered normal, for example, for people to go about their daily lives while connected to an iPod or mobile phone, engaging in distant social relationships via invisible communication networks while ignoring the presence of those nearby. This is a reversal of traditional social conventions, which directs attention to the needs of present bodies rather than absent bodies.

Whereas virtual environments "highlight the crisis of meaning surrounding the body" (Williams, 1998, p. 120), the peculiarities of embodiment offers a site where the political effects of hegemonic discourses can be re-shaped and given new meaning. Making embodiment visible is, therefore, problematic for the colonisers of cyberspace as it requires a corresponding awareness of the environment that sustains the embodied subject. While new technologies do not spew plumes of black smoke into the air they nevertheless require a high use of plastics and toxic chemicals (Millar, 2000). Add to this the designed obsolescence of computer products and the number of trees needed to supply paper, the sweatshops set up in third world countries to produce cheap computer products, the

piecemeal work offered to women to keep them at home where they can look after the children and do other invisible work, and the importance of embodiment as a political site looms back into perspective (Millar, 2000). Embodiment, therefore, foregrounds “technology’s duplicity as a concurrently liberating and disciplining force” (Balsamo, 1996, p. 123).

2.3.5 Global markets: Liberation or exploitation?

The Australian Government’s Department of Education, Employment and Workplace Relations’ (2000) website declares that:

Technological change is transforming the way we live and work. It is vital that all Australians have opportunities to develop the knowledge, skills and understanding needed to prosper in a high-technology world.... At the same time, the business of education and training is itself being transformed. (n. p.)

Discourses that promote ICT use construct education as a business. Education, and pedagogical practices are located within an information economy and this has a powerful influence on pre-service teachers’ understandings of the role of ICT in education, and the importance of developing ICT literacies for both the classroom and the workplace. The Internet, constructed as a global marketplace, signifies a potential arena for the “intensification of consumerist mechanisms” (Cavallaro, 2000, p. 35) and self-interested extraction, commodification and homogenisation of subordinate cultures, rather than an exchange of inter-cultural understanding (Holmes, 1997). Sardar (2000) goes so far as to predict that the homogenising effects of the colonial enterprise will lead to the “museumization of the world: where anything remotely different from Western culture will exist only in digital form” (p. 736). In addition, Rifkin (2000) claims the Internet facilitates the commercialisation of social relations:

The capitalist journey, which began with the commodification of space and material, is ending with the commodification of human time and duration. The selling of the culture in the form of more and more paid-for human activity is quickly leading to a world where pecuniary kinds of human relationships are substituting for traditional social relationships. (p. 9)

Online encounters with the cyborg, as the radical other of cyberspace (Borer, 2006), requires its domination through hegemonic discourses that validate the values and power relations of white, English speaking patriarchal societies. In cyberspace, gender, race, class and age must be enacted through language alone, “without any marks and gestures of

the body, without clothing or intonations of voice” (Poster, 1997, p. 223). In multi-user domains, where people can pick and choose their identity, race and sex are constructed as harmless categories, dislocated from any localised, political issues. The World Wide Web, which has the capacity to infinitely multiply and disperse the stories of individuals, decontextualises culture from the site of its enactment. Once removed from the immediacy of the unique sites of embodied experience, the significance of marginalised cultures, as lived corporealities, is reduced to a spectacle and commodity. Millar (2000) critiques the seductive and deceptive nature of cyberspace:

Like the civilizing mission of the colonial period, new digital technologies are sold to the world as a new liberating “truth” in ... the name of development.... a price must be paid for inclusion in the global marketplace of the future. Even if your place in that global marketplace is one of exploitation. (p. 152)

The social divisions of race, gender and class are reinscribed through the provision of separate online environments that cater to the needs of different groups. The exotic is assimilated into western categories as spectacles for the assumed central subject: the wealthy, white male consumer. Nakamura (2000) relates to this phenomenon when she describes an interesting code of behaviour in Internet role-playing games. Players are not encouraged to describe themselves in racial terms as this can be seen as engaging in a form of hostile performance, threatening the “integrity of a national sense of self which is defined as white” (p. 712).

The irony of neutral, social spaces as representing potential sites for conflict suggests that any social space humans inhabit will provide a new arena for the enactment of their imperialistic tendencies. This human trait is effectively parodied in the film *Dr Strangelove* (Kubrick, 1964) when the President of the United States declares to the Russian ambassador and an American general, “Gentlemen, you can’t fight in here, this is the war room”.

2.3.6 The speed of technology and the inertia of bodies

The use of ICT in education is powerfully informed by ICT discourses of speed and efficiency. Due to an increasingly crowded curriculum, the effectiveness of pre-service teachers’ pedagogies are assessed in terms of speedy and efficient information transfer. Promoting speed as a property inherent in new technologies promises efficiency in terms of the amount of time required to achieve a goal. Nike’s (Nike Inc., 2008) famous

marketing slogan, just do it, suggests that speed is a goal in itself. This encourages the indefinite deferral of responsibility because there is simply no time in the present to plan or evaluate the purpose and effects of such speed. Technology is evolving so rapidly there is no time to acknowledge corporealities through policy writing, reflection or critique. As a result, discourses that announce the imminent arrival of the future promote an a-historic understanding of progress.

In the metaphorical space of digital networks embodiment is no longer the key referent for signifying practices and this makes new discourses of space, time and reality possible. Space and time are constructed through the same discursive processes that bring objects into being (Grosz, 2005). The conscious manipulation of objects in space is made possible by the temporal awareness resulting from language practices, which constructs continuity as a force that moves the subject or object of discourse from a past towards a future.

Diminished by narratives of continuity that privilege the concepts of the past and the future, the present is constructed simply as the point of convergence, merging with the grander narratives of the past and present to appear undefined and indefinite. Borges (1998), however, problematises the past and the future by focusing on the present. He describes the past as the accumulations of memories that inform the present and the future as the anticipated consequence of present practices:

the future has no reality except as present hope, and the past has no reality except as present recollection. (Borges, 1998, p. 15)

ICT discourses that promote speed and efficiency, however, construct the present as a transitional phenomenon and promote instead, an impossible spatial arena for the intensified experiences of the always present, corporeal subject: the future. Announcing the future's immanent arrival, while concomitantly disparaging the past as a technological backwater (Millar, 2000), draws attention to the lack of time in the present for embodied practices so that the gratification of desire must be infinitely deferred. Consequently the present is constructed in terms of absence and lack. Grosz (2005) engages with the ambiguous and amorphous nature of the present, portraying time as both relentless in its continuity and finite in its effect upon bodies, writing, "whereas time is a continuous movement, our time, the time of the living, is finite, limited, linked to mortality" (p. 4). Time is a concept dependent upon the subjects that enact its passing and is, therefore predicated upon embodiment.

ICT discourses have also enabled the conceptualisation of time as being paradoxically both finite in terms of affordability, and infinite in terms of social commerce. Time is constructed as a limited and precious resource for consumption and the segmentation of time into hours, minutes and even nanoseconds renders time into a manageable and commodifiable item. For online communities there is a price for social access and interaction:

When everyone is embedded in commercial networks of one sort or another and in continuous association by way of paid leases, partnerships, subscriptions, and retainer fees, all time is commercial time. (Rifkin, 2000, p. 10)

Interfacing with technologies that are designed to augment the body also produces an expectation of enhanced performance in terms of efficiency and speed. The anticipation of a speed induced, addictive, adrenaline rush creates the demand for even more speed and orients the subject to the habit of speed. Computer rage and road rage evince the frustration experienced when attempting to put the liberating potential of technologies to use within the confines of meatspace: a derogatory hacker term for the off-line world.

Wajcman (1991) writes that, “the very latest technology signifies being involved in directing the future and so it is a highly valued and mythologised activity” (p. 145). Technology discursively confers upon the user a richer systemic organisation (Grosz, 2005, p. 150) and this change in design represents a shift in purpose, so that symbiosis with technologies of speed, such as the car or the computer, promotes speed as the new teleological imperative. Speed is the end goal and technology is the means. The future possibilities of prosthetic enhancement, therefore, signifies increased human potential in terms of acquiring new abilities that act in defiance of the pragmatic needs of embodiment:

Man transforms the world according to his interest, and in the process he transforms himself in ways that he may not be able to acknowledge. (Grosz, 2005, p. 149)

ICT discourses and cyborg metaphors foreground the potential body as the determining factor for establishing new benchmarks for performance and progress. Having filled the world with instruments designed for speed, however, humans are increasingly frustrated and disenchanted by their experiences of corporeal bodies that cannot keep up.

2.3.7 Novelty: The freedom and tyranny of change

A dominant ICT discourse that informs understandings of ICT practices in the classroom relates novelty with change and progress. Pedagogies associated with new technologies are constructed as progressive and innovative. Technology's identification with youth culture and its association with newness possesses the allure of *Immortal Engines* (Slusser et al., 1996). The irony of new technologies raising the possibility of re-making bodies and extending the human life-span, however, lies in the fact that technologies themselves do not age gracefully. They are discarded with ease once they are deemed old or outdated:

In a world of customized production, continuous innovation and upgrades and ever narrowing product life cycles, everything becomes almost immediately outdated. To have, to hold, and to accumulate in an economy in which change itself is the only constant makes less and less sense. (Rifkin, 2000, p. 6)

ICT discourses of constant newness promise informational excess and an infinite supply of new gadgetry. Consequently, such discourses construct the technologically enhanced individual as up-to-date and innovative. Novelty and turnover are now the key signifiers and driving engines of change and progress. Furthermore, constant newness creates a heightened awareness of the speed of progress and stimulates the individual's need for speed. Bukatman (1993) explains, "the spectacle is infinitely self-generating: it stimulates the desire to consume ... a desire continually displaced onto the next product and the next" (p. 37).

The increasing focus on novelty and turnover overlooks the fact that technological progress has not made life any easier for the majority of people, who live on or below the poverty line, or labour under the oppressive structures of hegemonic relations. The technologisation of female spaces, for example, has not produced the promised emancipatory effects in the workplace, and in the home technology has raised the bar for domestic performance. Wajcman (2004) points out that "mechanization of the home had not substantially decreased the amount of time women spent on household tasks" (p. 28).

Speed itself is a significant factor in the subjugation of corporealities. Cooper (1997) writes, "technological progress infinitely promotes speed, as the subject passes from a perceived freedom of movement to a tyranny of movement" (p. 100). Consequently, instead of using the present to design and prepare for more equitable and emancipatory

social structures, the urgent spectacle of digital innovation coerces the subject into taking up a reactive stance to social change.

2.3.8 Hyperreality: Representing the real or realising the representation

Another contradictory rationality established at the nexus of ICT and educational discourses is constructed around the concept of reality and authenticity. ICT discourses construct the phenomenon of the hyperreal so that ICT use represents authentic learning. The more spectacular cyberspace appears, the less compelling and significant lived realities appear. As the normative body is privileged, the significance of embodiment is diminished. Increasingly, embodied spaces are judged against the simulated: the ideal woman is a technologically enhanced photographic image; some of the most famous people in the world are actors who earn a living by simulating the lives of others; the most photographed bridge in America is substantiated by, and valued for, the multiple reproductions of its image. Embodiment is devalued because it is transient and non-reproducible. Green (1997), points out the irony of the depreciation of corporealities in cyberspace, explaining that:

the process of meaning-making is embedded in corporeal interaction between human bodies and computer hardware and software. Attending only to digital spaces ignores the physicality of technological production and consumption in everyday processes of interaction, and the negotiation of meaning that occurs during such encounters. (p. 63)

It is ironic that simulacra are imbued with greater substance than originals precisely because of their potential for replication, distribution and circulation. A simulacrum can be endlessly and perfectly reproduced and is, therefore, “a self-referential image” (Williams, 1998, p. 121) that undermines the presence of an original. Furthermore, simulation induces a perception of sophistication through the technologisation of the original, “making the very idea of originality conditional upon the possibility of simulation” (Cavallaro, 2000, p. 50).

The effect of the hyperreal on social relationships is evident in Poster’s (1997) claim that “public tends more and more to slide into publicity as character is replaced by image” (p. 219). Corporeal, public spaces are no longer viable for those individuals who desire constant social contact with as many people as possible. The public arena of cyberspace is liberating by comparison, offering a textual network of relationships 24 hours a day so

that being represented on the “Media Grid” (Bukatman, 1993, p. 105) is one way of maintaining a feeling of presence and substance.

Temporal substance, or the perceived quality of time, is increased by the effect of the visual spectacle. Informational overload condenses and extends time by:

pushing language beyond its transparent narrational function to a largely visual spectacularity, leaving the reader to grapple with the ... random patterns of noise and crisscrossing informational systems. (Bukatman, 1993, p. 32)

Instead of the subject negotiating and accommodating various corporealities, corporealities are expected to conform to cultural ideals by simulating and reproducing the normative body so that “the relationship between representation and reality becomes radically reversed” (Williams, 1998, p. 121). Hegemonic groups no longer need to justify their position by referring to a pre-determined world order because, like the map that precedes the territory (Baudrillard, 1994), the hyperreal signifies the constant deferral and subjugation of the original:

Reality cannot be understood apart from the processes of simulation operating behind it, and simulation both draws upon and produces new realities. (Bruce, 2001, p. 162)

The hyperreal signifies the problematic relationship between the real and representations of the real. Embodiment represents the un-capturable and indefinable nature of the present in which the lived body enacts the making of the world. Nevertheless, in the digital age, when replication is effortless and everywhere, when computer images are framed as sharp, shiny and colourful, and cyberspace offers a fast paced, action packed social arena, corporeality seems bland and claustrophobically finite by comparison.

2.3.9 Cyberspace: An arena for active or passive bodies?

What appears to be a liberatory and disembodied space for social relations may in actuality be closer to escapism or passive enslavement (Borer, 2006), and critical pedagogies aim to disrupt, critique and transform oppressive ICT discourses. When Haraway (1991) declares machines to be “disturbingly lively and we ourselves frighteningly inert” (p. 152) she is referring to the cultural effect new, digital technologies have on corporealities. Digital technologies and their associated discourses of speed, novelty and new public spaces have tipped the scales in favour of the normative body.

Wajcman's (1991) claim, that technology is primarily about the creation of artefacts, takes into account the increased power of the normative body in cyberspace as she argues that digital discourses have not ushered in a new order, but instead reinforces traditional relations of sex, class and race. The hyperreality constructed by digital discourses is a seductive illusion and Cavallaro (2000) makes the point that "the principal aim of cyberspace is to make us forget that this is the case" (p. 212).

Information overload is a "bombardment of the senses that results in a numbing, a dulling of the senses, a prevention of response and a pacification because there is no time to respond" (Williams, 1998, p. 121). When there is too much choice, when information exceeds needs and overwhelms the senses, when time and space are saturated and condensed by the promise of novelty and one visual spectacle after another, there is no time to consolidate oneself as an agent of meaning making processes. The user enters, instead, into the cybernetic paradigm, becoming a workstation and anonymous cell (Cavallaro, 2000): a node in an endless, self-referential feedback loop. Hayles (1999a) explains the concept of the feedback loop as a system that operates "within the boundaries of an organisation that closes in on itself and leaves the world on the outside" (p. 136). Individuals become isolated and pacified, caught up in the circular currents of information, unable to identify themselves as a source of meaning.

"The speed of technological innovation and the dizzying pace of economic activity" (Rifkin, 2000, p. 6) not only makes the notion of agency problematic, but also the notion of ownership of, and accountability for, the self. As technologies "draw their meaning from the cultural and political climate in which they are embedded" (Stanworth, as cited in Wajcman, 1991, p. 60), it is important to note how fast capitalist discourses contribute to the commercialisation of the body and human relations. Wajcman (1991) writes, "the body is caught up in commerce in new ways, with human organs such as kidneys, eyeballs, frozen fetuses and gametes being traded on the international market" (p. 73).

2.3.10 Productive technologies and reductive communities

Constructing the body as a machine through the constant application of machine and computer metaphors underlies the propensity to apply increasingly technologised remedies to negotiate problematic pedagogical relations. New ICT literacies, for example, which promote constant engagement with the highly regulated structure of cyberspace,

can undermine the ability to operate with the more complex and often contradictory and resistant structures of individual corporealities. Cyberspace relieves the individual of the burden of dealing with bodies. Physical presence requires not only the right words but also the appropriate proximity, dress, posture, gestures, facial expressions, inflection, pitch and loudness of voice, eye contact, timing of response and heightened alertness to avoid embarrassing silences or misunderstandings or offensive body emissions.

Furthermore, the relationship between corporealities is not an “objective, external and exigent one, but an intrinsic, necessary condition for [one’s] subjective existence within a culture, a language community, and a world” (Basu, 1995, p. 135-136). Willson (2000) argues that the search for:

constant yet apparently superficial stimulation is leading to the promotion of instant gratification at the expense of more involved, complex, meaningful investigation and understanding. (p. 649)

It is the embodied experience of, and engagement with, dominant and resistant discursive structures that constructs active and wilful subjects.

Technological determinism promotes a “gradual and willing accommodation of the machine” (Gibson, 1984, p. 203). This is evident in society’s acceptance of the increased regulation and surveillance of individuals. The western individual is increasingly: being caught on speed cameras, videotaped while shopping, monitored for work efficiency, identified and recorded when using discount cards, or taking out a loan or providing tax file numbers or passports.

In addition, computer technologies conflate public and private information and render all data easily transferable, copyable and manipulable. The effect is an increased onus on the individual to prove their identity and to confirm authorship and authenticity in a communications network inundated with information and capable of magnifying the severity of a single human error to devastating proportions. Incorrectly inserting a decimal point or leaving the computer workstation without logging off, for example, can have disproportionately serious consequences. The liberating potential of new technologies is, therefore, tempered by physical isolation, a loss of privacy and the increased opportunities for misrepresentation or identity theft.

The myth of free information as inherently liberating and progressive also starts to unravel when the environment and individuals' lived realities are reconceptualised in terms of informational resource for the purpose of commodification and control. Hayles (1996) explains the reductive nature of the body in cyberspace when she writes:

In cyberspace, point of view does not describe the character; it creates him. Lacking a body and reduced to his consciousness, the character literally is his point of view. (p. 118)

As a mere point of view, the individual becomes a very commodifiable and infinitely rewritable entity. If, however, the self is everywhere in the disembodied realm of cyberspace, as point of view and omniscient narrator of the spectacle, then that which is consumed represents the self (Myers, 2001). Cavallaro (2000) explains that "otherness is an internal dimension of our being" (p. 87). The loss of otherness signifies a process of decay and stagnation instead of creativity and innovation, for without the experience of being both object and subject to another, there is no basis on which one can become aware of one's self (Sartre, 1956).

In cyberspace, dispersed and disembodied cultures complicate and undermine the individual's sense of self and purpose. Traditional community discourses that construct a relational continuity between bodies also construct a temporal narrative that enacts the teleological function of providing the memories accumulated in the present the possibility of attaining some kind of completion or ideality in the future. Basu (1995) suggests that cultural narratives represent "a kind of formal anticipation of the kind of structure it should take to become a whole" (p. 139). While cultural narratives construct individuals in terms of their potential completion, this sense of completion is always conditional upon the signifying practices of the community within which the individual's wholeness, or lack of wholeness, is enacted.

Language, as a fundamental technology, smoothes over the differences between the world and the models made of it (Hayles et al., 2000). At the same time, the inscription of the world on unique and individual corporealities through language, actively works to produce anomalous and resistant experiences. In contrast, the new electronic media, in generating a world of pure simulacra (Borer, 2006), encourages greater homogeneity within online communities and elides the importance of embodiment as the site of and for the production of meanings. The hyperreal represents a solipsistic process, a closed

information loop, as any gratifying and self-affirming experience in cyberspace can be digitally captured and replayed, endlessly confirming the individual's sense of self-containment and freedom of action. Cavallaro (2000) states:

Hyperreality ... constructs us as passive consumers of assorted false promises and manages to keep us in its thrall by making us forget that we are the world's inmates rather than free agents. (p. 212)

In a consumer society, simulacra are the ideal commercial products as they replace the original with a copy that can be bought and sold endlessly and instantaneously. Digital technologies make the transmission and duplication of information instantaneous and effortless, effecting "costless reproduction, instantaneous dissemination and radical decentralization" (Poster, 1997, p. 215). With ease of production comes ease of endless modification so that the original is lost amongst the many versions of itself. The loss of the original represents Baudrillard's (1983) concept of implosion, which refers to:

the absorption of one pole into another, the short-circuit between poles of every differential system of meaning, the effacement of terms and of distinct opposition and thus that of the medium and the real. (p. 102-103)

Being detached from embodiment as the site of and for the processes of inscription and incorporation encourages a sense of self-containment and self-sufficiency, denying the enabling effects of objects and otherness and expanding the subject and selfhood (Robins, 2000, p. 85). At the same time, however, the Internet, representing a disembodied and dispersed community, promotes a teleology of total connectivity through imagining a space "more important than the real space" (Nunes, 1997, p. 166) it simulates.

Total connectivity is impossible for the embodied subject. The paradox of connectivity points to the disconnection of the individual from the embodied interactions of the present and this phenomenon elucidates "the solitary nature of participation" (Willson, 2000, p. 646) on the Internet. Heim (1993) argues that, what technology gives with one hand, it often takes away with the other, as access to the seemingly endless and self-affirming vistas offered in cyberspace is only possible at the cost of embodied relations:

The computer network ... brackets the physical presence of the participants, by either omitting or simulating corporeal immediacy. In one sense, this frees us from the restrictions imposed by our physical identity; ... in another sense, the quality of the human encounter narrows. (p. 92)

The blurring of the “divide between presence and absence” (Cavallaro, 2000, p. 32) is also evident in the metaphor of the information super highway. The information super highway not only connects people, it also divides communities and offers an escape from embodied relations and responsibilities:

You can shape your route so that you interact only with people of your choosing and with information tailored to your desires ... [at the] risk of idealizing the information superhighway as a total conquest of space which perpetuates conventional illusions of mastery. (Cavallaro, 2000, p. 30)

The corporeal spaces of suburban communities have experienced the divisiveness of highways, with women and children in particular being deterred from crossing these dangerous spaces by foot. In the film *Thelma and Louise* (Scott, 1991) the highway also signifies an escape from the confines of hegemonic spaces for two female protagonists. The road and the car, both symbolising freedom and speed, facilitates a series of short and self-indulgent relationships that culminates in an exhilarating, but ultimately nihilistic, ending.

Representing oneself in the always available space of the Internet can supersede the individual's need for embodied relations because the teleology of connectivity is based on the idealisation of the cyborg's endless interface. Mere representation, however, without reference to historical, local and cultural narratives undermines the individual's locatedness within the continuity of narratives that construct social relations. Where there is no sense of continued presence the subject is absolved of responsibility or purpose.

2.3.11 Ethics: Embodied or disembodied relations

School communities are constituted by and through difference and difference constitutes the basis for ethics and informs the need for critical pedagogies. Engaging with difference recognises the uniqueness of other beings and requires an acknowledgement of, and respect for, alternative worldviews. To ignore these differences or attempt to appropriate and diminish them through oppressive regimes that represent a singular truth is to destroy the productive potential of a community (Willson, 2000).

Ethics implies the continued performance of complex and focused embodied interactions so that time and space are socially enacted and negotiated. Embodied individuals do not disappear at the click of a mouse. They are consistently and persistently present until the

culturally acceptable time of, and ambience for, departure is negotiated and signified. A sense of community arises out of such embodied experiences that require an element of trust in, and vulnerability to the other. Accountability for one's own embodied actions is thereby increased, generating a greater awareness of the politics and importance of community. Rifkin (2000) writes:

Traditional relationships are born of such things as kinship, ethnicity, geography, and shared spiritual visions. They are glued together by notions of reciprocal obligations and visions of common destinies. (p. 241)

Virtual social relationships, however, are more intensely self-selecting, "exactly what a real community is not" (Sardar, 2000, p. 744). The intensification of commodified relationships is also predicated upon the need to pay for connectivity, consequently encouraging interactions of shorter duration and signifying the pecuniary nature of connectivity in the digital age. Online relationships are established by neither history nor legacy but by performance, results and economic viability. Commodified relationships are "expected to serve the interest of the client and customer, as opposed to traditional communities, in which members are expected first to serve the interests of the group as a whole" (Rifkin, 2000, p. 242).

The need for speed and the desire for novelty drive the consumer society and promotes the increased commodification of information and cultures. Speed signifies efficiency and novelty represents change and progress, but without embodied communities these factors are ends in themselves. Speed and novelty should serve community in terms of quality of relations to others and the world.

Productivity must be measured in terms of a society's total input and output. This means the negative consequences of technology-induced unemployment as well as social and environmental cost must be considered. When assessed in this way, it is clear that rapid technological progress has not delivered the efficiency it has promised. (Millar, 2000, p. 155)

Ethical relations emerge out of the shared narrative structures that represent the preconditions for community consciousness. Responsibility develops out of the need to promulgate the identity of the subject in ways that cohere with, and support the publicly agreed upon discursive structures (Basu, 1995). Ethical relations are, therefore, enacted as collective and consultative acts that acknowledge and consolidate community narratives,

just as laws are not products of individual clamour, but are intended to reflect the constitutive elements of the community as a whole (Sardar, 2000, p. 746).

ICT metaphors can be misleading (Millar, 2000). The World Wide Web for example, signifies a global network via the information superhighway. While such metaphors promote an intensified experience of time and space, as individuals talk about connecting with other across the world in an instant to engage with a global, multicultural, information-rich community, they also eclipse the perspectives of those who have no access to computers. If the global community exists online, then bodies with no ICT access are obscured by the collective vision constructed in cyberspace.

2.4 Conclusion

This chapter has examined the ways in which ICT discourses legitimise hegemonic rationalities and marginalise the alternative perspectives afforded by embodiment. A genealogical framework has demonstrated how diverse and historically located discourses reconfigure the body and establish various systems of subjection. This was followed by a focus on the significance of the cyborg in representing the blurring of human and machine boundaries to establish the posthuman condition. With no bodies to represent sites of difference, tension and contestation, stereotypes and dominant discourses become more powerfully entrenched in the social imagination and individual agency is diminished. Furthermore, ICT discourses promote the robot teleology of autonomy as a form of epistemological completeness, deemed achievable through the unchecked production and consumption of information. Such discourses construct the information superhighway as a neutral service, the student as an autonomous individual, and language as a “transparent conduit for the transmission of meaning in information” (Kapitzke, 2003, p. 45).

This chapter has raised important questions about teleologies based on notions of evolution, emancipation and technological progress. A number of mutually constitutive, and paradoxical relationships have been presented to problematise understandings of ICT practices in education and to open up the research to engage with the ways in which teachers can be enculturated into ICT discourses that undermine their own professionalism and constrain the development of critical pedagogies that promote uniquely situated and inclusive classroom relationships.

Chapter three

Methodology: Qualitative strategies

3.1 Chapter overview

This chapter contextualises the research within the assumptions and characteristics of a qualitative approach to research (Cresswell, 1998, p. 2) and discusses the methodological principles underpinning a multi-methods approach to data collection and analysis. The researcher's use of critical discourse analysis and constructivist grounded theory and their theoretical coherence with feminist poststructuralist research are also examined. This is followed by a discussion of the methods used for the generation and collection and analysis of data. The final section of this chapter engages with the politics of representation by examining ethical issues related to the generation, collection, analysis and representation of the data. The limitations of the research are also presented. The political nature of interpretive processes is critiqued, and the role of the researcher within the research process is problematised.

3.2 Methodological Principles

Methodological principles inform the research process by linking theory with practice and referring to ways of organising and conceptualising data. As Hatch (2002) argues that it is important for researchers to “consider how it is possible to know the world or gain knowledge of it” (pp. 11-12), this section articulates the researcher's methodological principles by connecting a feminist, poststructuralist theoretical framework to a qualitative strategy of inquiry, and incorporating the principles of critical discourse analysis and constructivist grounded theory for the collection and analysis of data.

Traditional research methods do not necessarily account for new social phenomena such as increased pluralism and the ubiquitous use of ICT. They may not sufficiently explain how new categories gain prominence, take broader social and discursive contexts into account, or explain new forms of organisational change (Phillips & Hardy, 2002). Furthermore, each interpretive framework informs the questions that are asked and the interpretations that are possible. In this research, the link between theory and practice is

articulated by Phillips and Jorgensen (2002), who argue that reality or realities “can never be reached outside discourses and so it is discourse itself that has become the object of analysis” (p. 21).

Informed by qualitative strategies of inquiry, this research combines a critical discourse analytic approach (Carabine, 2001), with constructivist grounded theory methods (Charmaz, 2000, 2006) in order to support, enrich and facilitate an understanding of the ways in which particular discursive configurations come into being and prevail in contemporary, educational settings, and to reveal forms of oppression resulting from discursive structures and the mechanisms by which such “regimes of truth” (Foucault, 1984d, p. 73) are perpetuated. It is intended that this mixed methods research design also: enables an exploration of how organisational discourses shape identity and practices; makes visible modes and techniques of social regulation; investigates official authorisation of privileged discourses; deconstructs, disrupts and problematises privileged discourses; and constructs alternative discursive positions in order to acknowledge and empower marginalised individuals (Luke, 1997).

Methodology is interwoven with particular perspectives (Lincoln & Guba, 2000) and this thesis makes explicit its epistemological and ontological position, as being informed by feminist-poststructuralist theories. From this viewpoint, research is not undertaken for the purpose of discovering a “final and absolute truth” (Ezzy, 2002, p. 16). It is seen as a tentative and provocative process “with the focus shifting from prediction and prescription to disclosure and deconstruction” (Hamilton & McWilliam, 2001, p. 37).

Poststructuralist theorists use the processes of deconstruction to examine textual representations of the world, searching for aporia, inconsistencies or gaps, where the internal logic of the text unravels. For this reason, this study uses a mixed method research approach to provide a more inclusive research framework for identifying a range of subject realities and for constructing descriptions of the world that are complex and overlaid with competing and perhaps contradictory understandings (Ezzy, 2002; Liamputtong & Ezzy, 2005). Furthermore, a critical, feminist paradigm foregrounds the importance of using research to raise the consciousness of those oppressed by historically situated language structures tied to race, gender and class.

Feminist poststructuralist methodology (Weedon, 1987) frames this research, not as an objective truth, but as “a located and limited story, which is fully transparent about who the storyteller is [and] how the teller came to know and present the story” (Daly, 1997, p. 360). Truth is not to be conceived of as an entity or an end point, but rather as a shifting location; part of a continuum which represents the tension between one’s own perspective and the perspective of the other person (Ezzy, 2002). A feminist poststructuralist approach contributes to this view of truth by acknowledging research to be an enactment of power relations (Lather, 1991). Such a methodology “attempts to understand experiences from the standpoint of those being studied” (Liamputtong & Ezzy, 2005, p. 23) by examining, presenting and representing the texts they produce while at the same time acknowledging the perspective and voice of the researcher as the interpreter of texts. If the function of hegemony is to represent a homogeneous and stable reality, then feminist poststructuralist research (Lee, 1992) aims to challenge regimes of truth by examining how “politics can transform reality rather than merely ideologize it” (Trinh, as cited in Liamputtong & Ezzy, 2005, p. 2).

3.2.1 Qualitative strategies

Informed by feminist poststructuralist theories (Weedon, 1987), this study uses a qualitative approach in order to foreground the interpretive nature of any research study. This approach does not deny the importance and usefulness of quantitative strategies in sorting, measuring and comparing large amounts of information, but it does question the assumptions behind any approach to data collection and analysis that constructs the researcher and the research process as being objective and beyond the influence of any discursive conditioning.

A qualitative approach problematises the concept of an empirical social world by viewing interpretation as a complex process, which needs to acknowledge the “changing and inconsistent nature of social reality” (Ezzy, 2002, p. 16). Such an approach concedes that any account of the world provided is always provisional rather than absolute, limited rather than comprehensive (Symes, 1992, p. 35) as no text can fully represent the world of lived experience (Denzin & Lincoln, 2000).

This chapter seeks to contribute to the examination and development of theories, which “deal with the role of meanings and interpretations” (Ezzy, 2002, p. 3). Researchers

construct the objects of and for inquiry at the same time that the research process privileges the perspective of researcher as the interpreter of signs, so that every aspect of the research process is inevitably shaped by the political and ethical positions available to the researcher. Heim (1993) explains, “The type of question we ask ... shapes the possible answers we get. The way in which we search limits what we find in our searching” (p. 15).

Critical, qualitative research frameworks promote an awareness of the social, cultural and political attitudes and values, which influence any approach to the interpretation of data. The key is to understand the selective and perspectival nature of any interpretive framework (Mason, 1996). Denzin and Lincoln (2000) explain:

Any gaze is always filtered through the lenses of language, gender, social class, race, and ethnicity. There are no objective observations, only observations socially situated in the worlds of – and between – the observer and the observed. (p. 19)

Feminist poststructuralist researchers engage with a nebulous and shifting reality and work with and against the nihilistic implications of Derrida’s (1976) assertion, that “there is nothing outside the text” (p. 158). Garrison and Leach (2001) suggest that that the answer must lie within the text, writing, “for Derrida, meaning is endlessly created” (p.70). Language focuses, constructs, orders and prioritises our experiences, thereby making them real or meaningful (Polkinghorne, 1988) and is “central to all human experience” (Ezzy, 2002, p. 17). Consequently, a critical discourse analytic approach is used in this study to explicate the relationship between texts that construct nature, the body and human potential, and texts that validate teachers’ classroom practices for the purpose of opening up spaces for the development of critical pedagogies.

Qualitative data analysis commences at the beginning of the study and informs “part of the research design, part of the literature review, part of the theory formation, part of the data collection, part of the data ordering, filing and reading, and part of the writing” (Liamputtong & Ezzy, 2005, p. 258). Consequently, qualitative research projects do not always begin with a clearly defined problem (Liamputtong & Ezzy, 2005) as the range of social discourses identified in the data contextualise what can be problematised or seen to be an issue in the first place.

Nevertheless, data collection for this study did not begin with a random compilation of textual data. The combined methods of Carabine's (2001) critical discourse analysis and Charmaz's (2000, 2006) constructivist grounded theory were used to inform the data collection and analysis for this research project. As interconnected, interpretive methods (Denzin & Lincoln, 2000), the two methods combined offer a more densely contextualised, (Phillips & Hardy, 2002) understanding of the worlds of experience: relating individual texts to social context by making discursive techniques and networks and their political effects visible. Framing the study within the assumptions and characteristics of a qualitative approach to research requires an open and evolving design. In addition, the presentation of multiple realities (Cresswell, 1998) ensures the acknowledgement of personal and local narratives as representative of individual and community realities. Informed by Carabine (2001) and Charmaz (2000, 2006), a combination of inductive and deductive theorising has been used in this study for defining and identifying key research issues and questions for this study.

3.2.2 Critical discourse analysis

In order to understand how language and other signifying practices figure as elements of socio-cultural processes, critical discourse analysis (Charmaz, 2006) looks closely at language or texts in use for the purpose of identifying patterns of textual representation (Taylor, 2001). Critical discourse analysis differs from other forms of qualitative research through its commitment to a social constructivist world view (Phillips & Hardy, 2002). Furthermore, critical discourse analysis (Charmaz, 2006) is not only a methodology or set of assumptions that explain how and what can be known about reality by foregrounding the constitutive effects of language, but also a method or set of techniques for conducting a "structured investigation of texts" (Phillips & Hardy, 2000, p. 5). Discourses are particular ways of representing and understanding the world. A useful definition of the term discourse is provided by Phillips and Hardy (2002), who define discourse as "an interrelated set of texts, and the practices of their production, dissemination, and reception, that brings an object into being" (p. 3).

Under the broad category of qualitative research, however, discourse analysis (Phillips & Hardy, 2000) can draw from an interdisciplinary family of methodologies, hence the need for a clear articulation of the researcher's theoretical position, identifying the ontological and epistemological premises that inform and direct the research process. A positivist,

social constructivist discourse analytic framework, for example, might aim to understand or interpret social realities as natural phenomena, thereby potentially reifying and naturalising pre-existing categories. In contrast, a feminist poststructuralist critical discourse analytic approach would explore “how the socially produced ideas and objects that populate the world were created in the first place and how they are maintained” (Phillips & Hardy, 2002, p. 6). While both approaches set out to “describe, interpret, and explain the relationships between language, social practices, and the social world” (Rogers et al., 2005, p. 11), a critical approach foregrounds the discursive processes of change and coheres with a poststructuralist position that recognises the integral role of language in constituting social realities.

In addition, a critical stance requires a move beyond description and interpretation. Critical discourse analysis aims to also understand, uncover and transform conditions of inequality (Rogers et al., 2005, p. 5). This is in keeping with a feminist research agenda, which is concerned with issues of power and justice. Critical discourse analysis, by focusing on language as a cultural tool, also makes visible the way in which power is enacted through the discourses privileged by dominant institutions and the means by which these privileged discourses serve as modes and techniques of and for social control (Phillips & Hardy, 2002) through the perpetuation of hegemonic regimes of truth (Rogers et al., 2005).

Critical discourse analysis aims to make visible the assumptions that structure and limit ways of thinking and being in the world in order to open them up to examination and critique. The aim is not to “abandon or even necessarily to criticise the sciences, technologies, or our preoccupation with the pragmatics of the thing, but rather ... to understand both their limits and their residues, with what they have been so far incapable of dealing” (Phillips & Hardy, 2002, p. 21).

Critical discourse analysis also acknowledges the problematic nature of research by calling into question the objectivity, neutrality, and independence of the researcher and locating the researcher and the research within discourses. In scrutinising the nature of what passes for truth and knowledge, critical discourse analysis provides not only the methods but also the methodology for research design as the question of how things work is replaced by questions about what things mean, how they came to achieve those

meanings and how researchers are implicated in the interpretive process (Phillips & Hardy, 2002). As the researcher's discourse "moves back and forth between reflecting and constructing the social world" (Rogers et al., 2005, p. 5), it becomes an ethical imperative for the researcher to make explicit, and reflect constantly upon, his or her worldview and acknowledge how that worldview also contributes to the enactment of power relations within the context of the research itself.

Supported by feminist poststructuralist theoretical underpinnings, a critical discourse analytic approach questions taken-for-granted knowledge, acknowledges historical and cultural specificities, is "anti-foundationalist and anti-essentialist", and is able to articulate the link between knowledge and social processes (Phillips & Jorgensen, 2002, p. 5).

3.2.3 Constructivist grounded theory

The strength of grounded theory has to do with its strong inductive character. This research takes up Charmaz's constructivist version of grounded theory (2000, 2005, 2006) which:

... does not assume that data simply await discovery in an external world Nor does it assume that impartial observers enter the research scene without an interpretive frame of reference. (Charmaz, 2005, p. 509)

Charmaz (2005) acknowledges that researchers use their own histories, interpretive frames and interests as part of data gathering and analysis. Constructivist grounded theory (Charmaz, 2000, 2005, 2006) is consistent with, and supports, the provisional, flexible and inductive approach of critical discourse analysis and avoids a simplistic or random approach to theory building. Constructivist grounded theory also provides an important link between research theory and rigorous, systematic research practices by constructing detailed associations between conceptual and categorisational processes. Constructivist grounded theory is also sufficiently flexible so that its practical application can vary with the specifics of the area under study.

Constructivist grounded theory (Charmaz, 2000, 2006) is used to identify patterns of language use, and moves between inductive and deductive processes: through multiple cycles of grounding theory in the data and using the data to inform further theory building. In this way, theory building takes place through "an ongoing dialogue between pre-

existing theory and new insights generated as a consequence of empirical observation” (Liamputtong & Ezzy, 2005, p. 266). This process aids the development of theories that are conceptually dense and allows the identification of patterns of action and interaction.

Constructivist grounded theory (Charmaz, 2000, 2006) acknowledges the effect of pre-existing theory by referring to the inevitable influence of the literature reviewed for the research study. In this respect, it is always mediated by prior experience and other epistemological lenses. “A constructivist grounded theory adopts grounded theory guidelines as tools but does not subscribe to the objectivist positivist assumptions in its earlier formulation” (Charmaz, 2005, p. 509). This fits with a feminist, poststructuralist position that claims there is no such thing as purely inductive theory building, removed from all deductive processes, as any study takes place within a range of pre-existing discourses that construct the object of inquiry in the first place. Theory building is not a one-way process, but a circular one, that recognises the continuous interplay between data collection and analysis (Charmaz, 2000).

Data is collected early in the research process and analysis begins as soon as this initial data is collected in order to inform the ensuing direction of the research process. Data collection informed by ongoing analysis should facilitate theory building as theory evolves from and is built on the “thoughts, experiences and artifacts the researcher gathers during the analysis of data” (Sarantakos, 1998, p. 200). Emerging theories in turn should direct the researcher to the literature which best informs, explains and contextualises the findings (Goulding, 1998).

The aim of such an approach to data collection and analysis is to generate a theory closely related to the context of the phenomenon being studied (Cresswell, 1998) while at the same time avoiding the forcing of data into theory. Ezzy (2002) explains that, “a deductively derived theory is one that is logically derived from more general principles” (p. 8). Such a method restricts the possible interpretations of observable data. Theory should, therefore, be constructed directly from the data in such a way as to avoid some of the pitfalls of deductive reasoning, which can allow theoretical preconceptions to distort and limit the researcher’s focus on the data (Lather, 1991a).

3.3 Methods: Generation and collection of data

This research uses a multi-method approach informed by Carabine's (2001) framework for Foucauldian genealogical discourse analysis which is shown below. Steps three to eight are undertaken using Charmaz's (2006) approach to constructivist grounded theory, ensuring the use of multiple levels of abstraction and the construction of theory that is explicitly linked with and grounded in, the data.

1. Select your topic
2. Know your data
3. Identify themes, categories and objects of the discourse
4. Look for evidence of an inter-relationship between discourses
5. Identify the discursive strategies and techniques that are employed
6. Look for absences and silences
7. Look for resistances and counter discourses
8. Identify the effects of the discourse
9. Context 1: background to the emergence of the issue (truth effects)
10. Context 2: Discuss the issue in terms of power/knowledge relationships.
11. Be aware of the limitations of the research, your data and sources.

(Carabine, 2001, p. 281)

3.3.1 Data

This section explains how the researcher used the combined, conceptual frameworks used by Carabine (2001) and Charmaz (2006) for the collection and generation of data. Methods used for data collection and analysis in any research project need to be designed with consideration for not only the researcher's methodological paradigm and with the interests of the participants in mind, but also with a measure of flexibility in response to opportunities as they present themselves in the field.

The research process described here suggests that data gathered and analysed in the field, although rich, informative and representative of authentic teaching contexts, can prove to be insufficient for addressing the research question. In this situation, fieldwork can nevertheless serve to inform, direct and support alternative strategies for data gathering by directing the researcher's attention to issues deemed significant by both the participants and the researcher. These issues can serve to focus, reinforce and justify the identification and collection of additional data. Additional data are considered relevant if they contribute by providing further substantiation of significant categories, corroborating and developing relationships between social phenomena, and including multiple perspectives. As a result of data collection, informed by constructivist grounded theory processes (Charmaz, 2000,

2005, 2006), the decision was made to add to the data a set of extant texts, which serve to reinforce the pervasiveness of the categories identified at the original research site. These extant texts are an independent source of data and complement the original data set.

3.3.2 Know your data

3.3.2.1 Theoretical sampling

This research design has been informed by, and incorporates, the principles of theoretical sampling. Theoretical sampling represents the concomitant processes of collecting, coding and analysing data (Charmaz, 2006; Goulding, 1998), whereby the questions of what data to collect next, where to find it and for what theoretical purpose are constantly refined. This supports inductive theory building by directing the researcher to new research participants or locations rather than relying on predetermined characteristics and size of the sample (Goulding, 1998), since “we cannot assume to know our categories in advance” (Charmaz, 2006, p. 100).

Theoretical sampling can help to identify the purpose of, and need for incorporating a variety of data sources (Dey, 1999) in order to adequately address the research questions (Phillips & Jorgensen, 2002). Additional data sources can serve to account for, and illuminate, the range of conditions and relationships (Charmaz, 2006) between emerging categories, thereby helping to “check, qualify and elaborate upon, their boundaries” (Charmaz, 2006, p. 107).

Theoretical sampling is also used to delimit the overwhelming possibilities of choice (Liamputtong & Ezzy, 2005) by allowing emergent theoretical criteria to set the parameters of the conceptual field. Any data source represents a selection from a wide variety of texts constructed through the research process. Which texts are to be used in the research, therefore, depends on the emerging theory as it relates back to the research question (Phillips & Hardy, 2002). As “discourses are not neatly packaged” (Phillips & Hardy, 2002, p. 74), being explicit as to why certain texts have been chosen (Rogers et al., 2005) is helpful for further contextualising the “construction of the object of analysis” (Phillips & Hardy, 2002, p. 72).

3.3.2.2 Theoretical sufficiency

The theoretical sufficiency of codes and categories is also facilitated by theoretical sampling, which ensures there is sufficient data for making and justifying an interesting argument (Phillips & Hardy, 2002).

Categories are saturated when gathering fresh data no longer sparks new theoretical insights, nor reveals new properties of these core theoretical categories. (Charmaz, 2006, p. 113)

Category development, therefore, is dense to the degree that “all of the paradigm elements are accounted for [and] the relationships between categories are well established and validated” (Strauss & Corbin, 1998a, p. 188).

Within a feminist, poststructuralist research framework, categories are understood to be indefinite and mutable constructs that are constituted by a dense network of discursive relationships, which, in turn, define the research context. Unless criteria are used to determine when to stop gathering data, theoretical sampling can produce a ripple effect that incorporates an ever-increasing range of coding relationships. Use of the term saturation, however, can be problematic for feminist, poststructuralist researchers. Saturation suggests that a theoretically closed system is a desirable research finding. A system that claims to be complete in itself, however, does not open up new spaces for future inquiries, but instead, forecloses possibilities for further examination by suggesting that all variables have been, or can be, accounted for.

For this reason, instead of the term saturation, the concept of theoretical sufficiency is used circumspectly and critically in this research to refer to categories as being supported by, rather than saturated by, data. Theoretical sufficiency is evinced in this study by a dense network of codes and categories and supported by a coherent argument for their constitutive effects within specific, discursive frameworks. Data gathering and theoretical sampling are delimited by referring to a point in the analytic process where “data no longer sparks new theoretical insights” (Charmaz, 2006, p.113), nor reveals new properties of the core theoretical categories under examination. Consequently,

... saturation is not seeing the same pattern over and over again. It is the conceptualization of comparisons of these incidents which yield different properties of the pattern, until no new properties of the pattern emerge. (Glaser, 2001, p. 191)

3.3.2.3 The researcher's observational journal

This research began with an orienting review of the literature, which positioned the researcher to question how teachers experience and understand the use of ICT in relation to their pedagogy. Data collection and initial coding for this research study commenced as soon as a suitable and accessible on-line teaching site was identified. Two teachers, as research participants, allowed the researcher sit in on their online English classes as an observer only. Access to a computer and the online teaching forum was provided and explained. The focusing research question, asking how teachers understand the role of ICT in education, remained loosely defined as an inquiry into the ICT/pedagogy nexus. The parameters for collection and analysis of data in the field were determined by the use of key concepts such as student literacy practices, teacher pedagogy, and teacher attitudes towards ICT use. These concepts were used as “points of departure” (Charmaz, 2006, p. 17) for identifying data in the field relevant to the research question.

In the field, data collection and analysis were undertaken together, with one process informing the other. Emerging codes and categories suggested that teachers' language use reproduced the values and views of institutional documents, corroborating their official roles as teachers with a high level of subject specific and general ICT competencies. Student voices were notable for their lack of response to teachers' questions as much as for their frequent requests for technical assistance. The researcher took detailed notes in an observational journal (Budd, 2005) during all online teaching sessions over a period of six months. These notes recorded descriptions of a variety of events: visual and spoken texts produced by students and teachers, points of interest, personal feelings and assumptions about people or processes. These notes played an important part in the verification process of interpretive practice (Knobel & Lankshear, 1999). The researcher's observational journal (Budd, 2005) helped to make explicit the personal understandings and attitudes of the researcher (Knobel & Lankshear, 1999), particularly when viewed retrospectively.

A summary observational report was then provided to the teachers for feedback. It was hoped that the observational report would act as an eliciting device (Charmaz, 2006), used to focus and encourage conversations with participants to draw out their perspectives on particular issues (Knobel & Lankshear, 1999). The aim of eliciting feedback was to

facilitate an understanding of how participant subjectivities are “in-formed” (Van Manen, 1990, p. 62) and transformed by the literacy practices of a particular teaching and learning site. Teachers were actively and repeatedly encouraged to comment verbally or write their own notes on the observational report provided by the researcher, reflecting and commenting upon the events and issues mentioned. The purpose for this was two-fold: to provide the researcher with an insider (Charmaz, 2006) voice on issues, and to encourage teachers to reflect on their own pedagogies. The teachers, however, declined to comment.

By studying the emerging codes and categories, using constructivist grounded theory (Charmaz, 2006) as well as reflecting on the methods of data collection, it soon became apparent to the researcher that although rich and copious data had been collected, it remained conceptually thin in terms of addressing the research question and revealing what lay beneath the surface of the official discourses the teachers were drawing upon. The researcher’s journal, although useful in revealing a discrepancy between the official rationale for ICT in education and teacher pedagogy, was considered insufficient for building a rich network of teachers’ discursive strategies for relating ICT use to pedagogical principles. Cresswell (1998) engages with this issue when he writes, “individuals might withhold information, slant information toward what they want the researcher to hear” (p. 114). Another major concern about the observational report was that it represented the researcher’s discursive strategies instead of those of the research participants (Charmaz, 2006).

As a result, the researcher considered it necessary to make use of extant texts as an additional data source to enrich what would otherwise be an outsider’s perspective on ICT use. Charmaz (2006) explains, “if your data are thin and if you don’t push hard in coding, you may mistake routine rationales for analytic insights. In this way describing and analysing participants’ routines at face value can lead to outsider analyses” (p. 49).

Intrigued and directed by the initial themes emerging from the field and informed by the principles of theoretical sampling, the researcher’s focus on data collection shifted to address more closely the issue of change in education. The following is an extract from the researcher’s field notes:

I showed Teacher One Snyder’s (2002) statement, “a good education is the goal and technologies need to remain in the service of that goal: they must not be allowed to drive the agenda” (p. 173). Teacher One

disagreed, pointing out that new technologies are developing faster than new teaching pedagogies and new technologies make it possible to teach and present information in different ways. Teacher One said that technology makes it possible to think differently and therefore to some extent it should drive the curriculum. (Budd, 2008, n.p.)

Technology as a catalyst for change was identified here by the researcher as a significant category for further investigation. ICT in education was understood as being both the instrument of, and the answer to, change. The teachers at the research site had been teaching for more than 20 years and were established in their pedagogical practices. Nevertheless, the speed of change, heightened by the constant need to update online teaching hardware and software, appeared to undermine their sense of agency as teachers as their online class time was frequently interrupted by technical issues beyond their control. Furthermore, in spite of Teacher One's comment, the researcher observed that the use of ICT for delivering the curriculum did not appear to result in any significant change in pedagogy.

3.3.2.4 School handbook

In the absence of teacher participants' responses to the researcher's observational journal (Budd, 2005), the researcher turned to an examination of the school's handbook (Department of Education Tasmania, 2005). Analysis of the school's handbook (Department of Education Tasmania, 2005) highlighted three notable categories of change: access, inclusion and new ICT terminology. While these issues appeared to be highly significant, too much remained assumed, unknown, or ambiguous (Charmaz, 2006).

3.3.2.5 Pre-service teacher' examination papers

While constructivist grounded theory supports an ethnographic approach to data collection and analysis for the development of theory, it also supports the textual analysis of extant texts (Charmaz, 2006). Pre-service teachers' examination papers provided the main data source for the research. Using Charmaz's (2006) recommendation for seeking pertinent data to develop the theory emerging from the field and ensuring elaboration and refinement of categories, an adjustment was made to the data collection method to include the reflections of early career teachers on ICT use in education. Pre-service teachers' examination papers were analysed to ascertain how early career teachers use ICT in the classroom, to acknowledge different attitudes to and experiences with ICT, and to identify

any significant change in pedagogy that might evince new ways of thinking about teaching and learning with ICT. This shift in the data collection was made while taking into account the need to remain close to and develop the themes and codes of the original data set from the field.

Remaining attentive to the issues emerging from the researcher's analysis of data from the field and keeping in mind the importance of letting the research problems shape the methods, another set of extant texts was identified and incorporated into the research design. Using constructivist grounded theory principles (Charmaz, 2000, 2006), data analysis began to produce a conceptually dense, robust and complex set of codes and categories. Charmaz (2006) explains:

Theoretical sampling prompts you to retrace your steps or take a new path when you have some tentative categories and emerging, but incomplete ideas. By going back into the empirical world and collecting more data about the properties of your category, you can saturate its properties with data and write more memos, making them more analytic as you proceed. (p. 96)

Extant texts are “documents that the researcher had no hand in shaping” (Charmaz, 2006, p. 35). The extant texts selected to support, inform and qualify the codes and categories emerging from the field data consisted primarily of 66 pre-service teacher examination papers. Additional extant texts include the school handbook (Department of Education Tasmania, 2005) and the ICT case study (Garthwait & Weller, 2005). The pre-service teachers' examination papers were used as the primary data source because they portrayed the full range of categories evident in, but not sufficiently substantiated by the data from the researcher's observational journal (Budd, 2005). Most importantly, the texts produced by the pre-service teachers, were not influenced by the researcher in any way. They represented, instead, the discourses the pre-service teachers had been immersed in as both students and teachers. The extant texts represented pre-service teachers' interpretations of not only their ICT experiences in schools, but also the expectations of their students, their colleague teachers and their university lecturers.

During the year, pre-service teachers had been given four case studies to reflect on and discuss with their peers. The pre-service teachers had been advised that they would be required to write an examination paper on one of two case studies presented in the exam. All papers are handwritten and all pre-service teachers had been given a three-hour limit

for writing their papers. Of the 70 pre-service teachers who chose to write on the case study titled “A Year in the Life: Two Seventh Grade Teachers Implement One-to-one Computing” (Garthwait & Weller, 2005), 66 pre-service teachers consented to the use of their papers for the research study. The criteria for assessment of the examination papers were:

- Awareness and understanding of a range of theories and practices relating to teaching, learning and the curriculum
- Capacity to use a case study as a means of purposeful and meaningful inquiry into teaching
- Evidence of critical reflective practice

In evaluating the case study, pre-service teachers were required to critique two teachers’ classroom practices incorporating ICT use. Their critique was to be informed by their reflections on their own classroom experiences and more general observations of ICT use during their school experience. In addition, the pre-service teachers were required to provide theoretical references supporting their interpretations of the pedagogical intentions and practices as described in the case study and as experienced personally in schools.

The resulting texts produced by the pre-service teachers represent a range of complex and conflicting subject positions. Each pre-service teacher’s paper constructed a different reading of the case study in the light of not only their own experiences of ICT in schools but also their own discursive histories, which included the influences of peer groups, subject specialisations, home life and work experiences. This demonstrated the ways in which individual research participants were located within unique networks of discursively constructed, social relations (Kress, 2000). For data gathering purposes, an individual interview or a carefully designed questionnaire would not necessarily have elicited more accurate or cohesive responses from participants. Pre-service teachers in this study were not writing for themselves or for the researcher, but for an examiner. The examination papers, therefore, represented pre-service teachers’ interpretations of not only their own teaching and learning experiences in the light of the case study and the criteria for assessment, but also their understandings of the values and priorities of their examiner. It is recognised that the discourses constructed from the extant texts are, therefore, highly contextualised in terms of their production and the theoretical position brought to the interpretive processes by the researcher and are in no way representative of a single truth.

The theoretical categories identified in the researcher's observational journal of the online teaching and learning site are represented and substantiated by the extant texts. The additional data sets are not only descriptively rich, but also important in terms of representing a range of teaching contexts, experiences and individual perspectives and voices. The data also relates directly to the issues emerging from the original research site in terms of enabling a theoretical sufficiency of codes and coding relationships. The additional data sets depict a multiplicity of classroom events and represent participants' own discursive strategies for relating ICT use in their classroom practice.

3.3.2.6 ICT case study

In this research context, the case study, which is also an extant text, serves as an eliciting device, focusing pre-service teachers' reflections and drawing related responses. The case study, in conjunction with the assessment criteria, encourages pre-service teachers to "make comparisons with similar or relevant cases in their own fields of experience in order to transfer understanding and apply findings from their study to his or her own context or situation" (Knobel & Lankshear, 1999, p. 96).

To summarise, data was drawn from:

- The researcher's observational journal (Budd, 2005).
- The "Distance Education Tasmania Handbook 2005" (Department of Education, Tasmania, 2005).
- 66 pre-service teachers' examinations papers, in which they reflect on an ICT case study and their experiences with ICT in schools.
- One ICT case study (Garthwait & Weller, 2005).

3.4 Data analysis

This section explains the principles of Charmaz's (2000, 2006) constructivist grounded theory and locates it within the broader analytic framework of Carabine's (2001) Foucauldian genealogical discourse analysis. A more detailed description of the analytic process and examples of how constructivist grounded theory has been applied to the data are provided in chapter four.

3.4.1 Constructivist grounded theory

Constructivist grounded theory (Charmaz, 2000, 2005, 2006) is systematically obtained through social research and is grounded in textual data. It evolves from and is built on the “thoughts, experiences and artefacts the researcher gathers during the analysis of data” (Sarantakos, 1998, p. 200) and, therefore, recognises the interplay between data collection and analysis (Charmaz, 2000). A constructivist approach to grounded theory methods recognises multiple social realities, acknowledges everyday knowledge and experience as a valuable resource and “reaffirms the value of studying people in their natural settings” (Charmaz, 2000, p. 510). This is congruent with a feminist, poststructuralist research agenda that does not intend to uncover a universal or single truth, but aims, instead, to contribute to ongoing conversations about particular research issues (Lather, 1991b) by examining the origins and effects of provisional truths.

Carabine’s (2001) Foucauldian genealogical discourse analysis has previously been described in section 3.3 of this chapter. Listed below are steps three to eight only of Carabine’s (2001) Foucauldian genealogical discourse analysis. Steps three to eight are undertaken using the more explicit and transparent methods of Charmaz’s (2000, 2006) constructivist grounded theory approach to data analysis as they have been interpreted by the researcher.

3. Identify themes, categories and objects of the discourse.

Use line-by-line coding to identify active codes.

Use initial coding to establish conceptual patterns and relationships.

Use focused coding to substantiate emerging categories.

4. Look for evidence of an inter-relationship between codes and categories.

Use axial coding to explicate properties and parameters of categories as they relate to the micro context of the research question and research data.

5. Identify the discursive strategies and techniques that are employed.

How is this discourse given meaning and force?

Use theoretical coding, which operates at a more abstract level, to contribute to the theories that inform the macro context of dominant social discourses.

6. Look for absences and silences.

Theoretical sampling directs the researcher to follow up gaps in analysis: to identify what is inferred but not mentioned; expected but absent; to

identify limitations of dominant discourses.

7. Look for resistances and counter discourses.

Identify contradictions and discrepancies within dominant discourses.

Identify marginalised and subversive discourses.

8. Identify the effects of the discourse.

Discursive effects are informed by the process of theoretical coding.

In this research context, a feminist poststructuralist theoretical framework directs this macro level of coding to investigate how power/knowledge networks determine what is normal and desirable in a given culture.

3.4.2 Initial coding

The aim of initial coding is the identification of initial themes from the data and the interrogation of those themes for further possibilities (Ezzy, 2002). As the name suggests, initial coding is the first step in the coding process. Initial coding is rather open and general and allows for further refinement and reinterpretations. The process of coding begins as soon as data is collected: at the “outset of the analysis when the initial categories have still to emerge” (Dey, 1999, p. 99). The researcher begins with broad, sensitising questions to determine appropriate sites, methods, and foci of, and for, data collection. As data are collected, the researcher begins a thematic analysis, which is subjective and interpretive in nature, but “takes the data itself as the orienting stimulus for analysis” (Kellehear, 1993, p. 38), allowing the researcher to remain close to research participants’ voices and the context within which the data was produced.

Line-by-line coding is used in this research to identify “active codes” (Rogers et al., 2005, p. 14), as verbs not only signify action and agency, but also construct subject/object relationships. Line-by-line analysis also ensures a close examination of the data (Dey, 1999, p. 97), assists in developing familiarity with the data, and facilitates an inductive process from which ideas emerge (Charmaz, 2000). At the same time, pre-existing theoretical concepts sensitise the researcher to relevant research problems and foci without restricting the researcher to an entirely deductive process (Ezzy, 2002). Ezzy (2002) explains, “the researcher should enter into an ongoing simultaneous process of deduction and induction, of theory building, testing and rebuilding” (p. 10).

3.4.3 Focused coding

The focused coding process takes over when a number of emergent themes, or patterns of coding relationships are identified through the initial line-by-line coding process. Focused coding then proceeds to “verify, delimit and saturate” (Sarantakos, 1998, p. 203) those codes and categories that indicate a strong analytic direction. Charmaz (2006) writes:

Focused coding means using the most significant and/or frequent earlier codes to sift through large amounts of data. Focused coding requires decisions about which initial codes make the most analytic sense to categorize your data incisively and completely. (p. 57)

Coding then proceeds with the emergent themes in mind, looking for its recurrences in the data. The constant interplay between themes and raw data, and the renegotiation of their relationship to one another, helps to produce themes that are consistent, but not excessively overlapping.

Theoretical sampling, involving a constant interrogation of the relevance and usefulness of the data as it is being collected, assists focused coding by guiding further data collection and analysis, which are once again undertaken in the same rigorous and systematic manner (Ezzy, 2002). This cyclical process continues until coding reaches the point of theoretical sufficiency. It is advisable to revise research questions and methods at this point, and to review the relevant literature as patterns and relationships in the data start to develop. If new data sources are identified and new categories emerge, it is important to check for them in earlier data to ascertain their relevance and significance.

3.4.4 Memo-writing

This research design includes the use of memo-writing at every stage of data analysis to “chart, record and detail” (Charmaz, 2006, p. 72) categories and coding relationships. As patterns and anomalies emerge, memos are made to record new ideas, insights and questions. The process of memo-writing serves to explicate and record the comparisons and connections that are being made by the researcher. In addition, any omissions, gaps and inconsistencies evinced in the researcher’s memos are noted to help understand issues of bias, manipulation, hidden agendas and conflict (Kellehear, 1993). In this respect, memo-writing records and reinforces every level of the analytic process.

Memos act as a sub-text that reflects the position of the researcher in relation to the data, allowing and encouraging the researcher to enter into a dialogue with the self (Charmaz, 2006). Memo writing can not only encourages a reflexive awareness of interpretive processes, but can also be used to contextualise all data in terms of the conditions of its production and collection. Kellehear (1993) makes the point that “much of what you take down as ‘notes’ depends very much on why you are reading the text and what you wish to take from the reading” (p. 32).

Memos also make indefinite concepts and large numbers of codes more concrete and manageable (Charmaz, 2006). In this research, index cards were used to enable a physical manipulation of texts, thereby linking raw data more visually to specific codes and allowing codes to be assembled and compared in a number of different ways. This was found to be particularly useful for axial coding.

3.4.5 Axial coding

In axial coding, themes are verified and categories are developed further by assembling the data in new ways (Cresswell, 1998), “making connections between categories” (Dey, 1999, p. 97). In this respect, data analysis proceeds through various iterations employing constant comparison, and augmented as necessary by additional data collection (Charmaz, 2006). This process requires more intensive analysis (Sarantakos, 1998) and is intended to make the researcher’s emerging theory “denser, more complex, and more precise” (Charmaz, 2000, p. 515). The researcher commences by making connections between the categories. Open coding process of reducing data to bits of meaning for intense analysis, results in the fracturing of data. This problem can be addressed through the process of axial coding, during which the researcher categorises the data in terms of the conditions which give rise to it, thereby relating the codes back to an analytic whole (Ezzy, 2002). Axial coding represents the application of a coding process which requires an analysis of the relationships between codes and as they inform broader categories: conditions, context, actions, interactions and consequences. The axial coding process constructs the micro context for the emergence of discursive strategies and contributes to stages four, five, eight and 10 of Carabine’s (2001) guide to doing Foucauldian genealogical discourse analysis by giving an explicit account of discursive relationships as they operate in a particular context and as they inform the specific research issues.

Axial coding has been criticised for being too structured and, therefore, restrictive in terms of the inductive theory building process. This research design, nevertheless, incorporates the principles of axial coding and justifies doing so, by claiming that the distinctive structure of axial coding is not used to direct or restrict theory development, but to describe and make explicit the constitutional effects of codes as they relate to categories at the micro level of text and research context. Axial coding is used to explain to the reader how the researcher constructed particular meanings out of the data.

3.4.6 Selective and theoretical coding

Selective coding is used to delimit coding to core categories from which the theory emerges, and around which, other categories can be integrated (Dey, 1999). The principles that inform this process are similar to those of axial coding but are aimed at developing relationships between categories at a more abstract level. Core categories are then reconstructed as a storyline in order to refine and integrate the categories, thereby creating coherence and clarity (Cresswell, 1998) in the developing theory.

Theoretical coding supports selective coding by making the discursive framework of the storyline visible. Theoretical coding explicitly relates the storyline to broader discursive regimes that give meaning to conditions, actions and consequences by giving an account of discursive relationships as they “cohere in some way to produce both meanings and effects in the real world” (Carabine, 2001, p. 268). Informed by a feminist, poststructuralist research framework, theoretical coding conducted in this research study is concerned with “describing the procedures, practices, apparatuses and institutions involved in the production of discourses and knowledge, and their power effects” (Carabine, 2001, p. 276).

It is important to note that any storyline does not emerge of itself out of the data, but is a reflection of the researcher’s immersion and location within a particular confluence of discourses. Any storyline, therefore, represents the discursive regimes that not only construct the objects of inquiry, but also the aims and purposes of the research project.

3.5 The politics of interpretation

3.5.1 Generalisability

Qualitative researchers consider generalisability to be concerned with the meaning and interpretations which people give to their experiences. From a poststructuralist viewpoint, however, no interpretation of qualitative data is ever complete, as meanings and interpretations constantly change in response to the changing conditions of contemporary social life. Any data collected must, therefore, be viewed as being highly contextualised: a result of a unique intersection of time and place, changing identities and unstable social realities. With this in mind, it may be “impossible to replicate a research project as is required by reliability” (Ezzy, 2002, p. 53). Furthermore, there is no vantage point outside discourse that allows a neutral epistemological evaluation of the ongoing power relations, which are taking place (Said, 1989) in the research context. The research is therefore generalisable to those specific circumstances only (Corbin & Strauss, 1990).

This highlights and explains the need for transparency in relation to the ideological framework, which informs the strategies of inquiry and methods for collecting data. It is important to make explicit the constructed nature of any research as the outcome of an application of one researcher’s theoretical paradigm to the social world. This thesis, therefore, represents one of multiple possible interpretations and reconstructions of data collected from a highly contextualised social arena. The research artefact represents one voice, which has found an audience through the vehicle of a privileged, academic genre.

Although constructivist grounded theory identifies more abstract relationships in terms of patterns of action and interaction within an institutionally regulated setting, it nevertheless remains possible for the researcher to generalise in the limited and provisional sense that, where similar discursive regimes are identified, then the possibility of similar effects upon the construction of subjectivities are high. In this research, for example, the representation of discourses, not of individual persons, is a central concern. This means that the explication of pedagogical discourses, as they are constructed within a particular research context, can be used to theorise the range of subjectivities available in other, similar research contexts. Careful descriptions of the conditions under which codes and categories are constructed enables better comparisons for other researchers, and the process of abstraction, which takes place over the entire course of the research is made explicit by the rigorous processes of constructivist grounded theory methods (Charmaz, 2000, 2006).

3.5.2 Rigour

Rigour is established by gathering relevant, detailed information in a methodical way (Knobel & Lankshear, 1999). A systematic investigation (Taylor, 2001) ensures that there is evidence that “each concept earns its way into the theory by repeatedly being present ... or by being significantly absent” (Corbin & Strauss, 1990, p. 7). A rigorous inquiry also accounts for inconsistencies and diversity in the data and contributes to the maintenance of a reflexive stance towards decision-making processes.

Theoretical sampling and axial coding assists the researcher in guarding against bias by challenging and re-contextualising concepts with fresh data. The principles of constructivist grounded theory also ensure that clear links are established between the data and the developing theory by explicating the conceptual moves of the researcher at various stages of abstraction: from data to codes; from codes to categories; from categories to discourses.

3.5.3 Validity

It is important to acknowledge the impossibility of accounting for any research context in its entirety. “Different interpretations can be equally valid and meaningful depending on the theoretical orientation of the reading” (Knobel & Lankshear, 1999, p. 88). The criteria of validity is, therefore, reconstituted in this study to refer to the coherence of the findings within the research framework. Validity is also reconceptualised in terms of the contribution the research makes to an understanding of the issue under consideration (Knobel & Lankshear, 1999) and the relevance of its findings in relation to broader social or institutional conditions.

While the frequency of a code’s occurrence is, in itself, not a “valid or reliable indicator of importance” (Kellehear, 1993, p. 39), well-defined coding categories give “a strong impression of validity” (Kellehear, 1993, p. 39). Furthermore, a rigorous and systematic explication of relationships and their relevance to the research aims contributes to the soundness or validity of the emerging theory.

3.5.4 Ethics

3.5.4.1 The principles of ethics

Understanding must be discovered rather than assumed from the data. An ethical approach also relies on an understanding of and respect for the ethical standards of the group (Ezzy, 2002). Such an understanding evolves out of, and is based on mutual trust and cooperation (Sarantakos, 1998), representing an “ongoing political dialogue between people with a variety of vested interests” (Ezzy, 2002, p. 30).

Ethics based on the problematic of place recognises the mutually constitutive relationship between one’s world and one’s sense of embodiment within it (Diprose, 1994). New feminist ethics, in taking sexual difference into account, challenges the “abstract individualism of ethics, the validity of general moral principles and the assumed sexual neutrality of moral judgement” (Diprose, 1994, p. v). Feminist ethics foregrounds the need to take difference into account by conceptualising identity as constituted through relations of difference. Ethics, therefore, does not precede difference, but is constituted by the discourses and practices resulting from those relations of difference (Diprose, 1994):

Herein lies the paradox that produces us as both the object and subject of ethics, that we should find ourselves not only the judges of normative discourses that contain and oppress those at the margins, but also the vehicles through which those discourses do their work. (Diprose, 1994, p. 132)

Caring relationships are established through the assumption that the identities of the researcher and the participant are interdependent (Held, 1999, p. 90): that is, constituted by relations of difference. The researcher is situated within discourses that may sit in tension or cohere with those discourses that construct and identify suitable research participants:

The domains of political and linguistic representation set out in advance the criterion by which subjects themselves are formed, with the result that representation is extended only to what can be acknowledged as a subject. In other words, the qualifications for being a subject must first be met before representation can be extended. (Butler, 1990, p. 2)

Feminist, poststructuralist ethics calls for careful consideration of the conflicting and divergent power structures that construct the interdependent relationship between

researcher and participant, acknowledging that to “fragment and isolate are as destructive to [individuals] as to overwhelm and submerge” (Miller, 1999, p. 44).

3.5.4.2 The practice of ethics

After ethical clearance to undertake the research project was obtained from the University of Tasmania, the researcher sought and gained permission from the school involved. The researcher observed the online practices of two English teachers engaged in the normal literacy program of the school. The school, the students and the teachers were provided with information sheets explaining the purposes and procedures of the research, but the students passively declined to participate by not returning their consent forms. The emotional welfare of participants was considered at all times and it was for this reason that the researcher decided not to interview the teachers, who appeared disinclined to discuss or were, perhaps, unable to articulate, their pedagogic objectives when teaching online.

Information sheets and consent forms were also sent out to all pre-service teachers who wrote an examination paper on the ICT case study (Garthwait & Weller, 2005), to the School's Dean and to the relevant lecturer. As several students asked for further information, the researcher organised a presentation, during which, the aims and purposes of the research were explained in greater detail and students were free to ask questions or voice any concerns.

Every effort was made by the researcher to minimise intrusion, ensure confidentiality, demonstrate respect and avoid coercion or manipulation. It is, nevertheless, acknowledged that all data collected at the online teaching site has been affected to some degree by the presence and interpretive processes of the teacher/researcher, so that, “the subjects regulated by such structures are, by virtue of being subjected to them, formed defined, and reproduced in accordance with the requirements of those structures” (Butler, 1990, p. 3).

3.5.5 Reflexivity

Feminist poststructuralist research aims to broaden and democratise the conversation about human practices and to submit those practices to “a continuous process of reflection” (Schwandt, 2003, p. 310). Reflexivity is a heightened self-awareness and a

continual questioning of the epistemological and ontological foundations of the knowledge claims made by the research (Rogers et al., 2005):

The intention of the reflexive stance depends on the claims to knowledge and reality of the researcher and the extent to which the researchers turn these frameworks on themselves, either methodologically or theoretically. (p. 15)

This research engages with the problem of interpretation by using methods of data generation, collection and analysis, which are flexible and sensitive to the “social context in which data are produced” (Mason, 1996, p. 4), rather than being removed from real life. Such methods encourage a reflexive framework open to adjustments and adaptations, given the demands of the research question and context (Rogers et al., 2005).

Reflexivity positions the researcher as part of the language practices studied. Gergen and Gergen (2000) provide an example of researchers personally situating themselves within the research and disclosing their own situatedness and investment in the research process. At the same time, however, they also raise questions about the honesty of the researchers and criticise excessive reflexivity for its constant regression, which complicates and undermines the focus of the study. Reflexivity in this research context is, therefore, limited to explicitly situating the researcher within theoretical and discursive frameworks in order to avoid mistaking “local and contextual conventions for universal truth” (Gergen & Gergen, 2000, p. 1032).

Reflexivity also means being highly conscious of the research as culturally constructed and situated within discursive regimes that both enable and constrain what can be said. In this respect, research is always already structured and regulated. It is subject to the prevailing logics of language structures and epistemic regimes. Irony is, therefore, a fundamental condition of reflexivity:

Confronting and accepting this means getting used to using and troubling, at the same time, theories, concepts, traditions, and notions that have actually shaped our intellectual and social and political identities. (Tamboukou & Ball, 2003, p. 23)

The potential of the unique and embodied perspectives of researchers nevertheless lies in their ability to disrupt understandings and recast them under a different light. In acknowledging the researcher’s complicity in constructing a version of reality, responsibility is taken for claims made, as opposed to presenting an objective account of

the way things are. For both researcher and research participants, this can be empowering, as recommendations and findings signify the goals and liberatory possibilities of research for particular groups, by making visible the role they play in supporting or disrupting a range of discursive traditions (Phillips & Jorgensen, 2002).

Reflexivity means that critique contributes positively to the research process in terms of informing the researcher's influence on the research design, findings and interpretations of the study (Knobel & Lankshear, 1999, p. 88). Furthermore, a genealogical sensibility extends reflexivity beyond the research itself by contextualising and historicising the findings and continually interrogating "the factuality of their existence" (Tamboukou & Ball, 2003, p. 88).

3.5.6 Limitations

With regard to the constructivist grounded theory method described in this section, there are a number of limitations that need to be considered. Firstly, analysis is necessarily selective. Category boundaries are not clearly defined. They are fuzzy because there are always "different degrees of belonging" (Dey, 1999, p. 69). Category membership, therefore, becomes a matter of degree, not a clear dichotomy (Dey, 1999). Consequently, truth claims and predictability of category memberships are highly problematic.

Furthermore, "the way categories are structured reflects culturally specific domains of experience" (Dey, 1999, p. 82) so that categories do not objectively correspond to a natural order of things. For any set of data, there are many integrative possibilities, and in order to avoid confusion, there must be some recognition between the reader and the researcher of the various processes involved in the categorisation of data. Categories can not be considered in isolation, but "acquire their meaning in part from their place in the wider scheme of things" (Dey, 1999, p. 104). For this reason, categories should be considered and read in relation to the other data in the grounded theory analysis and in relation to the research aims. Categories should also be checked for consistency in terms of the way they are conceptualised and correlated with codes and discourses.

There are, however, limitations to any research design and one criticism of critical discourse analysis concerns its lack of rigor (Phillips & Hardy, 2002) in applying close textual analysis (Roger et al., 2005). To address this criticism, this research design

incorporates the rigorous and systematic principles of constructivist grounded theory. Being too systematic, however, can undermine the contribution constructivist grounded theory (Charmaz, 2000, 2006) makes to a critical discourse analytic framework (Carabine, 2001), by constraining the inductive nature of theory building, the emergent nature of the research question and design, and the identification of new categories of interpretation.

As discussed earlier, there are no clear cut-off points for data collection and analysis (Rogers et al., 2005), which means that theoretical sufficiency is inevitably subjectively determined. Said (1989) points out the political nature of any interpretive act when he states, “representation becomes significant, not just as an academic or theoretical quandary but as a political choice” (p. 224) so that “there is no vantage outside the actuality of relationships” (p. 216).

Ideologies are, therefore, read into the data, (Rogers et al., 2005) and academic genres privilege some voices over others. A research framework, for example, causes the researcher to think in certain ways and there is always the danger of “naturalizing those tendencies we endorse” (Tamboukou & Ball, 2003, p. 28). The political nature of language is problematised further by Burbules and Bruce (2001), who write:

In such a net of interactions, the full meaning and effects of discourse will be impossible to read off the surface meanings of the words themselves. The nature of the relations fostered by particular forms of verbal interaction may be utterly unpredictable from the actual intentions and purposes of the agents concerned. (p. 1103)

Relations between teacher and student, researcher and teacher, lecturer and pre-service teacher are not limited solely to the things they say when they are teaching as their discursive practices mutually constitute each other's position. The particular characteristics of a teacher are, therefore, “inseparable from the effects a teacher has in influencing, inspiring, intimidating, or inuring students to the benefits of education” (Burbules & Bruce, 2001, p. 1107).

In this research context, taking into account not only the background, personality and physical presence of each individual pre-service teacher, but also the diverse, specialist language communities represented, including, for example, the fine arts, languages other than English, history, mathematics, English, music, science, and physical education, it is conceded that the understandings they bring to their lecturers' discourses produce a

complex dynamic, the effects of which cannot be held constant across different groups at different times. Ezzy (2002) points out, “To understand knowledge as situated and embedded in social relations that are integrally political and practical undermines any pretension to be able to identify one final true account” (p. 22). The researcher’s account of the teachers’ experience is, therefore, highly contextualised and provisional rather than absolute.

Important voices not represented in the analysis include those of students. Although pre-service teachers can, to some degree, relate to student experiences as they are themselves still students, what pre-service teachers describe as their teaching pedagogy may not be an accurate reflection of what they actually do in the classroom.

Another criticism of the use of critical discourse analysis is that of the researcher’s own use of and location within discourses as a key problematic in design and inquiry. One example of this is the unquestioned practice of building theories of language and literacy based predominantly upon European script, languages and values (Rogers et al., 2005). This is an important point, because critical discourse analysis, in seeking to understand how subcultures experience marginalisation and aiming to empower them through representation, does so predominantly from the perspective of a hegemonic discursive framework. Feminist theory highlights the nature of any dominant, discursive framework as being partial and insufficient for the task of representing any marginalised group. Spender (1980) provides an example of this when she critiques the effects of hegemonic discursive frameworks on gendered relations:

not only were there more words for males but that there were more positive words ... many of the words for women had sexual overtones and despite the fact that there were more words for men, of the smaller sample assigned to women there were 220 words for a sexually promiscuous female and only 20 for a sexually promiscuous male (p.15).

Reflexivity is used in this thesis to refer to “a discursive element that posits that researchers are part of the language practices they study” (Rogers et al., 2005, p. 15). Researchers often position themselves as if they are outside of the texts they collect and analyse, demonstrating the need for increased reflexivity and the importance of understanding research as “a dialectical process that is not just about the object” (Phillips & Hardy, 2002, p. 83) but also about the researcher and the research process. Rogers et al.

(2005) write, “critics recommend that critical discourse analysis examine actual language patterns with some degree of explicitness and reconnect these patterns with the social and political themes that inform their work” (p. 14). This research addresses this criticism to some degree by acknowledging the need to represent the relationship between textual resources and social practices through the more structured and explicit processes offered by a constructivist grounded theory (Charmaz, 2000, 2006) approach to data collection and analysis: a process that demands close attention to patterns of language usage that privilege or marginalise particular subject positions.

Constructivist grounded theory (Charmaz, 2000, 2006) generates categories from highly contextualised data. Used on its own, however, constructivist grounded theory can be criticised for not problematising or critiquing readings of the data (Phillips & Hardy, 2002) as advocated by Carabine’s (2001) critical discourse analytic framework. Selected and used thoughtfully within an explicit methodological framework, however, a mixed method approach can compliment and strengthen both framework and method (Rogers et al., 2005). Although a combined methods approach does not necessarily result in more truthful or objective research outcomes, it can nevertheless assist in making the process of its production more conceptually dense, explicit and transparent.

A combined methods approach also allows different voices to pervade the text by opening representation up to multiple meanings and perspectives, thereby destabilising the totalising effects of theory. Since it is difficult to critique a theory on its own terms, the dialectic produced through a thoughtful combination of compatible methods can serve to “encourage debate among and between theoretical communities” (Phillips & Hardy, 2002, p. 84) about the strengths and weaknesses of any one method.

3.6 Conclusion

Researchers have their own personal paradigm or basic belief system; “their values, which will largely dictate ontological and epistemological underpinnings” (Goulding, 1998, p. 4). This chapter explains the feminist, poststructuralist theoretical underpinnings which inform the research study and provides the framework for the research design and analysis. A qualitative approach acknowledges the interpretive role of the researcher in producing the research and engages with the complexity of constructing meaning (Ezzy, 2002). A poststructuralist emphasis locates the research within broader social, historical and

political structures and concedes the “problematic, changing and inconsistent nature of reality” (Ezzy, 2002, p. 19).

The methodology of critical discourse analysis is discussed with particular emphasis on its link to constructivist grounded theory. The use of constructivist grounded theory (Charmaz, 2000, 2006) is discussed with regard to the collection and analysis of data, foregrounding its role in constituting the crucial link between the data and theory. Linking theory with practice is achieved through the rigorous process of coding in which data are systematically broken down, reconceptualised and reconstructed. Theory emerges from this continuous interplay of data and brings the researcher closer to the phenomena under investigation. The processes and results of the researcher’s use of constructivist grounded theory (Charmaz, 2000, 2006) are described and explained in the following chapter.

This chapter has also outlined some of the ethical and political issues that must be engaged with when conducting qualitative research. There are multiple ways of approaching research, and “different interpretations can be equally valid and meaningful depending on the theoretical orientation of the reading” (Knobel & Lankshear, 1999, p. 88). Criteria for producing accurate and useful research results such as validity, reliability, generalisability and objectivity are, therefore, acknowledged as highly problematic in this thesis.

Chapter four

Analysis: From codes to categories

4.1 Introduction

The previous chapter interrogates the methodological principles underpinning a qualitative research framework informed by feminist poststructuralist theories (Lee, 1992; Weedon, 1987). This chapter describes and applies a constructivist grounded theory approach (Charmaz, 2000, 2006) to the data collected for this research. The aim is to reconstruct the particular elements of the research landscape that inform analysis by engaging, informing and directing the researcher's reading of the data. Metaphorically speaking, it is to retrace, together with the reader, the conceptual paths taken by the researcher, pointing out along the way: the dead ends, the inviting side tracks that are regrettably left unexplored, the trails that loop back upon themselves, the direct and popular roads and the tangled places where things are lost and found.

This chapter aims to link theory to educational practice by examining the effects of ICT discourses upon teacher pedagogy. Analysis focuses on the discursive techniques and strategies pre-service teachers use as they articulate their understandings of the role of ICT in education and the effect of ICT on classroom practices and relationships. While constructivist grounded theory (Charmaz, 2000, 2006) enables the explication of the meaning making structures and strategies that constitute a discourse, the application of Foucauldian critical discourse analysis (Carabine, 2001) makes visible the effects of the discourse upon the individual by examining how the values and relationships constructed by language practices privilege some ways of being in the world and marginalise others. Carabine's (2001) Foucauldian, genealogical discourse analytic approach has also been used by the researcher to locate the discourses examined in this research within the macro context: the broader historical and socio-cultural context. This is done in order to foreground the relationship between power and knowledge, to denaturalise the human subject, and to implicate the normative body in the maintenance of oppressive regimes of truth.

This chapter foregrounds the perspectival and subjective nature of the research process by introducing the micro context of pre-service teacher subjectivities and pedagogies as they are constructed at the intersection of ICT and educational discourses. Research participants' voices are represented in italics throughout this chapter and are frequently grouped together to demonstrate the multifarious discursive techniques and strategies used to construct a range of pedagogic perspectives on ICT practices in education. In such groupings, individual perspectives are separated by a semi colon.

Reconstructing the analytic process from the identification of codes to the development of categories and from categories to emergent discourses can be done either simply and briefly or with great detail and complexity. It cannot, however, be done innocently. Detail and complexity are no more evidence of a truth than simplicity and clarity and both approaches to the re-reading and representation of data reveal more about the researcher's identity as the representative of a particular methodological perspective, than the nature of any original set of data.

The need to represent the analytic process through artificially clear and deceptively structured language is both enabling and constraining in terms of its effect upon both the researcher's and the reader's interpretations of the research. Rendering the unknowable realities of research participants into a chaos of fragmented data and reorganising them into a set of ordered and recognisable categories is, therefore, undertaken with a determinedly ironic stance that foregrounds the limits of knowing.

4.2 Open coding

Open coding is the first phase of the data coding process (Liamputtong & Ezzy, 2005). Open coding is the process of breaking down, examining, and categorising data for the purpose of facilitating the identification of reoccurring themes. This process commences with the researcher checking the data, line-by-line for active codes: that is, identifying discrete elements representing subject and action. Line-by-line coding is more manageable than word-by word coding, while still detailed enough to encourage a closer look at how parts of a sentence can produce meaning. New ideas, implicit meanings and subtle nuances emerge as concepts as they are identified line-by-line.

During open coding, the researcher actively searched for data related to sensitising concepts (Charmaz, 2006) which, in this study, include pedagogy, ICT use in the classroom, and teachers' attitudes towards ICT as a teaching tool. The open codes that were constructed through the initial coding process were then re-applied to the data in order to identify any inconsistencies or gaps that may have required the re-naming of an open code to more clearly represent its focus and meaning, or the construction of additional open codes to account for new and unexpected coding relationships. In this way, ensuing analysis used the data itself as the orienting stimulus for the development of categories. The reapplication of open codes to the data also ensured a constant comparison between, and development of, the open codes in terms of how they related to each other, as codes were sorted on the basis of both similarities and differences (Goulding, 1998).

As the open codes were developed and named by the researcher, they were allocated a number for ease of reference, and then reapplied to any subsequent data collected. Each occurrence of an open code in the data was highlighted, tagged with the corresponding open code number and counted. The counting of responses did not suggest that frequency was in itself an indication of importance as dominant codes did not stand alone, but were an effect of their relationships with other codes. Other codes were then attended to as significant in terms of how they supported, contested or were marginalised by the dominant code. The counting of open codes was, therefore, undertaken to assist in the recognition of such patterns of language relationships within the data.

Analysis of the research data produced over a hundred initial codes for each data source, of which, only a portion of the initial codes produced from each data source are listed in Tables one, three, five and seven of this chapter as examples of the coding process. There was no clear point at which the initial coding process was considered complete. What constituted sufficiency of detail or complexity depended on the amount of data to be analysed, the amount of time available for analysis and the disposition of the researcher. In this research, the initial coding process continued until recurring patterns were identified and relationships between codes were detected. At this point, open codes were named and recorded to facilitate the linking of codes together and to refine the rest of the coding process. Open coding ceased when no more codes relevant to the research question were apparent to the researcher.

The tables in the following subsection represent four data sources: the researcher’s observational journal (Budd, 2008); the school handbook (Department of Education, Tasmania, 2005); the ICT case study (Garthwait & Weller, 2005); and pre-service teachers’ examination papers. Tables one, three, five and seven provide examples of initial codes and their groupings as represented by the open codes. Initial codes are excerpts drawn directly from the raw data. Open codes represent the more abstract categories attached to the initial codes to show how they have been related to each other to inform ensuing levels of abstraction. Open coding reduced large amounts of data to a manageable format. Open codes were then used for the focused coding process, during which open codes were applied to, and checked against, the rest of the data.

4.2.1 Open coding: The researcher's observational journal

In the research field, the researcher attended a total of 21 online teaching sessions over a period of three school terms. The researcher’s observations and reflections were noted in a field journal (Budd, 2008) and analysis of the journal produced a range of coding results. One hundred and ninety-six initial codes were identified as being relevant to the research question, of which only the first 10 are recorded in table one below, to serve as an example of how initial codes were related and developed to construct the more abstract concept referred to as the open code. The initial codes and open codes in table one were drawn from the first part of one 30 minute online drama class as it was observed and recorded in a field journal. During this class, both teachers and students experienced technical difficulties, resulting in approximately ten minutes of effective teaching time out of the thirty minutes normally allocated.

Table 1: Examples of initial codes: Researcher’s observational journal

Initial coding	Open code
Student 1 doesn't have camera on	Confronting technology
Student 2 has trouble logging on	Confronting technology
Teacher can't make out student response	Confronting technology
Teacher has trouble logging on	Confronting technology
Teacher thanks anonymous star drawer	Interpreting texts
Teacher explains 5 second delay	Teaching ICT
Teacher asks student 1 to focus camera	Regulating bodies
Teacher asks if students can hear	Regulating bodies
Teacher asks students to confirm audio with tick	Regulating bodies
Student 2 keeps dropping out	Confronting technology

In order to remain close to the original text, expressions were drawn directly from the data to comprise the initial codes. Based on the understanding that relationships are established through doing, the researcher paid close attention to verbs, as verbs identify activity and serve to indicate degrees of agency and purpose. The first four initial codes, for example, indicated low levels of agency, as indicated by the words: doesn't have, has trouble, and can't make out. The subject and object of the action were included to contextualise action in terms of who was empowered or disempowered, with ST1 referring to student one and T referring to the teacher. Although the agents of action in the field journal were predominantly teachers and students, occasionally the researcher and a school ICT technician were mentioned, and more interestingly, in 23 instances, the agent was referred to as someone. This represents the high level of anonymity provided by the online medium and accepted by the teacher.

Table two below provides a list of the open codes that resulted from initial coding of the entire journal (Budd, 2008). It is important to note that the frequency of codes is greater than the original number of initial codes. This signifies the relevance of an initial code to more than one category and acknowledges the complex interweaving of relationships that informs the meaning making process.

Table 2: Summary of open codes: Researcher's observational journal

Code number	Open code	Frequency
1	Controlling ICT	17
2	Appropriating texts	31
3	Engaging community	16
4	Representing the self	21
5	Promoting ICT	7
6	Teaching ICT	6
7	Constructing texts	81
8	Interpreting texts	8
9	Confronting technology	19
10	Regulating bodies	9
11	Identifying bodies	2
12	Qualifying teacher efficacy	2

4.2.2 Open coding: School handbook

The initial and open codes below were drawn from the *Distance Education Tasmania Handbook 2005* (Department of Education, Tasmania, 2005), an information resource for parents and students. The 62 page school handbook is an important text as it represents the values and purposes of the school’s online teaching program. A total of 158 initial codes were identified as relevant to the research question, of which the first nine initial codes and their open codes are listed as examples in table three. The initial codes in table three represent the first two pages of the school handbook, which contain the introduction and enrolment criteria. For this reason, the issue of access stood out as a dominant code, both in terms of providing access as well as regulating access. A link to the previous data source, the researcher’s observational journal (Budd, 2005) was quickly established in this way. By noting the relationship between the open codes qualifying access, providing access and engaging community from the school handbook to those of confronting technology and regulating bodies from the researcher’s observational journal (Budd, 2005) as represented by Table one, connections were established not only between initial codes and open codes, but also between data sources.

Table 3: Examples of initial codes: School handbook

Initial coding	Open code
School supports disadvantaged communities	Providing access Engaging community
School utilises mixed modes of communication	Promoting ICT Constructing literacy
School supports disadvantaged individuals	Providing access Engaging community
Enrolment based on medical advice	Qualifying access
Enrolment based on geographical isolation	Qualifying access
Enrolment based on pregnancy	Qualifying access
Enrolment based on itinerant lifestyle	Qualifying access
Enrolment based on exceptional circumstances	Qualifying access
Enrolment based on principal's discretion	Qualifying access

Table four provides a list of the open codes constructed as a result of the initial coding process for the entire school handbook (Department of Education, Tasmania, 2005). Once again, the frequency of initial codes’ occurrences is greater than their original count. Counting initial codes under more than one open code acknowledges and makes visible a complex set of relationships even at this early stage of coding.

Table 4: Summary of open codes: School handbook

Code number	Open code	Frequency
1	Providing access	14
2	Changing education	7
3	Offering freedom	7
4	Promoting ICT	25
5	Engaging community	14
6	Presenting bodies	4
7	Qualifying access	18
8	Funding access	5
9	Engaging pedagogy	8
10	Delegating responsibility	44
11	Dispersing responsibility	4
12	Teaching ICT	12
13	Teacher qualities	5
14	Constructing literacy	3

4.2.3 Open coding: ICT case study

The initial codes and open codes below were drawn from the first two paragraphs of a shortened version of an article by Garthwait and Weller (2005), “A year in the life: Two seventh grade teachers implement one-to-one computing”. This article is an interpretive ICT case study used in the pre-service teachers’ examination. The interpretive ICT case study (Garthwait & Weller, 2005) was presented to pre-service teachers for discussion and analysis. In the context of this research project, the case study (Garthwaite & Weller, 2005) served the purpose of an eliciting device used to draw responses from pre-service teachers. Pre-service teachers’ reflections on the case study were intended to demonstrate their ability to inquire purposefully and critically into ICT practices in education. The case study examines “the facilitators and barriers for teachers in using laptops in the classroom” (Garthwait & Weller, 2005, p. 361) and the findings of the case study describe the effect of technical issues and technology policies on two teachers’ pedagogies. To understand pre-service teachers’ responses to the case study, the meanings and values produced by the case study itself was also analysed.

Table five below represents the first 10 initial codes listed, of the 126 initial codes identified as being relevant to the research topic, in the ICT case study (Garthwait & Weller, 2005).

Table 5: Examples of initial codes: ICT Case Study

Initial coding	Open code
State provides entire grade of students a laptop	Providing access
Computers are ubiquitous	Providing access Promoting ICT
Teachers hold a positive vision of the educational potential of laptops	Teaching efficacy Providing access
Rick devoted several years to a technology degree	Teaching efficacy
Rick evinces belief in the educational potential of ICT	Teaching efficacy
Researchers claim teachers must believe in ICT	Teaching efficacy
Susan only has 3 years teaching experience	Teaching efficacy
Susan holds family life as a high priority	Teaching efficacy
Susan is not a recent graduate	Teaching efficacy
Susan delayed her career for family	Teaching efficacy

Table five records that, once again, the issue of access was identifiable as an open code. This time, however, it was discussed in conjunction with the codes teaching efficacy and promoting ICT. At this point, coding relationships were not only becoming increasingly dense and complicated, but an interesting story line began to emerge. ICT in education appeared to be highly problematic. It was no longer a simple matter of empowering students by providing them with access to ICT, as coding also articulated the need to regulate and supervise access. Furthermore, certain aspects of ICT practice, such as those represented by the codes confronting technology and regulating bodies, signified disempowerment when linked to issues of access. An apparently insignificant open code from the school handbook (Department of Education Tasmania, 2005), named delegating responsibility, also suddenly gained importance when juxtaposed with the new open code, teaching efficacy, from the ICT case study (Garthwait & Weller, 2005). The code, teaching efficacy, focused on teachers’ technical competence with ICT and their willingness to facilitate their students’ access to ICT and this open code pointed to a new way of talking about and understanding teacher identities, responsibilities and pedagogies.

Table six provides a summary list of the open codes constructed as a result of the initial coding process. Again, the total number of initial codes is greater than their original count.

Table 6: Summary of open codes: ICT case study

Code number	Open code	Frequency
1	Confronting technology	4
2	Teaching efficacy	62
3	Qualifying student skills	8
4	Teaching pedagogy	23
5	Teaching ICT	4
6	Promoting ICT	25
7	Providing access	16
8	Managing student behaviour	4

Codes two, three, four, six and eight represent the actions and attitudes of the two teachers in the case study. Code four in particular relates to the learning theory principles that inform the pedagogy of the two teachers in the case study. Codes five, six and seven relate to issues of the curriculum, school policy and school infrastructure.

Although code one's frequency appeared insignificant in the context of the case study (Garthwait & Weller, 2005), it echoed the open code from the researcher's field journal (Budd, 2008), named confronting technologies, which referred to technical issues, thereby providing an important link across data sources. It was also noteworthy in view of the disproportionately large number of responses to it in the pre-service teacher exam papers.

4.2.4 Open coding: Pre-service teachers' examination papers

The examples of initial and open codes below were drawn from examination papers written by first year pre-service teachers. The criteria for marking included:

- Awareness and understanding of a range of theories and practices relating to teaching, learning and curriculum.
- Capacity to use a case study as a means of purposeful and meaningful inquiry into teaching.
- Evidence of critical reflective practice.

These criteria seemed promising in terms of eliciting the kind of information that would be directly relevant to the research question. Criteria one and two required an explicit connection between theory and practice. The researcher, therefore, anticipated that pre-service teachers would engage with the question of what good pedagogy might look like in practice and communicate an understanding of how ICT might facilitate or undermine teachers' attempts to put theory into practice. It was also expected that criterion three

might elicit examples of pre-service teachers' experiences of ICT use in the classroom during their time in schools. Critical reflective practice, in this context, required a critique of any significant incidents related to ICT. Critique might include an examination of their own, their students' or their colleague teachers' reactions, feelings or ideas, and a description of how ICT was used in the classroom and to what effect.

Coding began with a close re-reading of the examination papers and it was noted that certain key phrases or ideas were frequently drawn directly from the case study without any further reflection or comment. In some cases, pages of an examination paper simply constituted a summary of the case study, evincing no critical or reflective analysis. Sections of writing that summarised or paraphrased the case study were not included for analysis unless there was evidence of significant misinterpretation. In many of the examination papers, the first two or three pages consisted of a simple description of the ICT case study (Garthwait & Weller, 2005). Where mechanical or uncritical paraphrasing was encountered, a conscious decision was made to exclude these sections from the analysis to avoid re-presenting the ICT case study (Garthwait & Weller, 2005) instead of the pre-service teachers' own interpretive frameworks.

As with the other data sources, line-by-line coding was undertaken in an extremely intensive manner, using codes as close as possible to the original wording. To ensure anonymity, pre-service teachers' names were replaced with reference numbers. These reference numbers were then linked to each code in case of any future need to double-check a pre-service teachers' intended meaning in relation to the sentences that preceed and follow the code. Over 300 initial codes were constructed from the first 20 examination papers, which, on average, were about five to seven pages long. While sensitising concepts assisted to inform the preliminary sorting of data, initial coding produced sufficient diversity and complexity for new and unanticipated themes to emerge. This demonstrated how inductive principles can be brought into effect through the application of constructivist grounded theory principles (Charmaz, 2000, 2006).

Pre-service teachers' reflections on their personal experiences with ICT in schools were usually described and critiqued in the latter half of their examination papers. While all 66 pre-service teachers' examination papers were coded in their entirety, only the ten codes in Table seven below, which are typical of the first two pages of most of the examination

papers and which focus on the qualities of the two teachers in the case study referred to as Rick and Susan, are provided as examples of the initial coding process.

Table 7: Example of initial coding: Pre-service teachers' examination papers

Initial coding	Open code
Susan runs a teacher directed classroom	Teaching pedagogy
Susan's students learn by listening and reading	Constructing literacy
Rick has spontaneous student oriented classroom	Teaching pedagogy
Rick's students learn by inquiry	Constructing literacy
Teachers find ICT facilitates independent learning	Constructing literacy
Susan dominates by selecting online resources	Teaching pedagogy
Susan feels the need to direct learning	Teaching pedagogy
Rick lets students take responsibility	Teaching pedagogy
Susan prefers quiet	Teaching pedagogy
Susan circulates to direct learning	Teaching pedagogy

Pre-service teachers' analyses of Rick's and Susan's pedagogies were highly gendered. The issue of gender, however, was not pursued as a key focus for the research project. While a discussion of the effects of gender in conjunction with ICT use continues to play an important part in this research, an in depth examination of gender is beyond the scope of this thesis. The open code on gendering ICT remains, therefore, only partially developed and put to one side as one of a number of issues for future examination.

Table eight provides a list of the open codes constructed as a result of applying the initial coding process to the first 20 pre-service teacher examination papers. These open codes were then applied to the remaining 46 pre-service teachers' examination papers. Again, the frequency of initial codes' occurrences is greater than their original count.

Table 8: Summary of open codes: Pre-service teachers' examination papers

Code number	Open code	Frequency
1	Teaching pedagogy	174
2	Constructing literacy	100
3	Managing classrooms	52
4	Constructing teacher efficacy	165
5	Promoting ICT	177
6	Locating ICT in education	141
7	Accessing ICT	73
8	Engaging ICT	41
9	Determining ICT futures	26
10	Confronting technology	17

As with the researcher's journal (Budd, 2008), the school handbook (Department of Education, Tasmania, 2005) and the ICT case study (Garthwait & Weller, 2005), the initial codes for the pre-service teachers' examination papers were named in such a way as to remind the researcher quickly of its context and meaning. The frequency of an open code's occurrence was noted to provide evidence of recurring themes. Once the most frequently recurring codes were identified, however, the rest of the examination papers were read with these codes in mind and with the aim of recognising the various dimensions of the codes and determining their parameters.

In many cases it was difficult to decide which open code or codes to allocate an initial code to. If it did not fit any of the codes from any of the previous three data sources, it would be noted and put aside for future possibilities. As it was often the case that the open codes were dependent upon each other for the construction of meaning, the significance of a code within the research context would not become clear until the dimensions and properties of the other open codes were further developed.

Keeping a record of initial codes was crucial for establishing the conditions and parameters of meaning making for more abstract codes and for bringing to light new relationships and developing broader categories of association. Initial codes also informed the axial coding process, discussed in the next section, by detailing and defining the properties and dimensions of codes and their degrees of belonging to each other and to broader, more abstract categories.

The initial coding process enabled the identification of conceptual patterns within the data and made explicit the relationships implicated in the researcher's meaning making process. To continue coding at such a detailed level, however, was not practical for the huge amount of data represented by the pre-service teachers' examination papers. It was only possible to actively engage with and remember a limited amount of information at one time. At the point where the sheer number of initial codes began to overwhelm and undermine the recognition of coding patterns, the recording of each individual initial code ceased and the frequency of an initial codes recurrence was recorded under the broader category of an open code.

For this reason, memos necessarily became more detailed. Whenever new and significant qualities of a code were identified, the details were noted in memos that described and defined the parameters of the code and the relationships between codes.

The construction and significance of important codes during analysis was necessarily informed and framed by the review of relevant literature as the inductive process of open coding could easily have resulted in an overwhelming number of possible interpretations and categories. At each stage, codes were contextualised to relate back to their original data source. The relationship between the data sources contributed to an understanding of discursive effects as they operate at different sites and in different contexts.

4.3 Axial coding

Axial coding aims to make connections between a category and its subcategories and does so by reconstructing the data fractured by the open coding process according to its properties and dimensions. Through this process, categories are constructed, representing a framework within which coding relationships can be re-examined and reassessed. Open codes are interrogated in such a way as to refine their relationships through further consideration of the conditions that gave rise to them, their actions, strategies and political effects. This requires a constant re-examination of the initial codes and the context of the data source through the asking of questions and making of comparisons to facilitate an understanding of how categories and subcategories are represented in, and related across the data.

Axial coding intensifies the process of looking for and noting patterns, as the researcher must return to the data to look for evidence that supports and informs the developing categories and their relationships. The constant interplay between recognising patterns of meaning making in the data, naming categories and establishing their scope is what grounds grounded theory and manifests the ongoing and complex dialogue between inductive and deductive theory building.

While the axial coding process establishes more abstract categories, thereby enabling the integration of a larger number of related codes, focus on the context in which the codes were originally drawn is necessarily increased as connections between categories are examined. The practice of axial coding, therefore, articulates the link between theory and

practice, inductive and deductive theory building, producing a conceptual density of codes and coding relationships and ensuring the coherence of the emerging categories by constantly checking their meanings against the unique contexts out of which they were produced and their relevance in relation to the research question.

Categorising data at a more abstract level through axial coding also develops codes further and justifies their relevance to the study by making explicit their relationships to one another. In this research study, the axial coding process develops the organisation of a category by naming the phenomenon, determining its causal conditions and establishing its dimensions or properties. The first of these three elements, the phenomenon, is the abstract category itself, as it is defined by its subcategories. The second element, the causal condition, refers to the patterns of language use, which reproduce and validate the meaning-making process. This is a mutually constitutive relationship, because it is through patterns of language use that the subjects and objects of interest are constructed and given meaning. The third element establishes the properties of a category by locating its subcategories along one or more dimensions. The category controlling ICT includes a number of properties that constitute control such as agency, inclusion, access and values. These properties are identified by such dimensions as: agency/disempowerment; inclusion/exclusion; ease of access/difficulty of access; and positive attitudes/negative attitudes to ICT respectively. Axial coding thus avoids binary coding structures and acknowledges the liminal residues of the meaning making process: the gaps, which point to inconsistencies, the tensions, which concede indeterminate and shifting structures and the latent potential of the unnamed.

4.3.1 Axial coding: Researcher's field journal

The 12 open codes of the researcher's field journal were reassessed and condensed through the axial coding process with the aim of grouping concepts that identify similar phenomena under a more abstract category or conceptual label. To begin the process, the two most frequently recurring codes were examined, reasoning that they may serve to establish two dominant themes. These two codes were code two, appropriating texts and code seven, constructing texts. It became evident, however, that both codes related to various aspects of online literacy practices. While code two, appropriating texts, identified subversive texts produced by students, code seven, constructing texts, referred to non-spoken forms of students' online communications. This includes use of icons such as

smilies, clapping hands, ticks, crosses, highlighting, arrows, underlining, stars, coloured dots, asterisks and flashing crosses, as well as writing tools utilising various fonts, colours and patterns. Looking for more of the same, code eight interpreting texts was identified as an effect of codes two and seven, as code eight represented teachers' struggles to interpret the meanings behind students' non-verbal communications. In this respect, code eight, together with codes two and seven, served to contribute three properties to a more abstract category that was eventually named practising literacy.

From the remaining nine codes, the most frequently recurring code was identified: code four, representing the self. Looking at the other remaining codes, code three, engaging community, code 10, regulating bodies and code 11, identifying bodies were identified as working to construct the concept of community. These codes were then all subsumed under the code engaging community as this label better represents the broader category. Most of the initial codes constituting code three, engaging community, occurred during an online school assembly, or during chat room sessions among the students. This code notes every occurrence where a student explicitly acknowledges the presence of another. Code four, representing the self, at first appeared to be more relevant to code seven, constructing texts. Code four, however, only referred to instances where students communicated their presence or identity to an online community in a way that did not require a response. Examples included an embellished or a misleading logon name and anonymous postings of graffiti on the screen. Codes 10, regulating bodies, and 11, identifying bodies, both acknowledged the importance of the physical body in establishing and validating the online community.

Of the five remaining codes, the most significant in frequency were codes nine, confronting technology, and one, controlling ICT. Both these codes represented instances where teacher or student agency was at stake. Code nine, confronting technology, referred to technical issues that were beyond the expertise of the teaching staff, and code one, controlling ICT, referred to instances when ICT was used to increase teacher agency in terms of allowing them to control access. These two codes were combined to constitute the two extreme dimensions of a category named controlling ICT. This category also included code six, teaching ICT, which represented instances of an individual directly providing technical information or assistance to another.

The two remaining codes, code five, promoting ICT and code 12, qualifying teacher efficacy, were also included in the category controlling ICT. Code five, promoting ICT, worked along the positive/negative dimension as it denotes instances where ICT were positively or negatively commented on. When participants felt very much in control this would draw positive words such as engagement, fascination, freedom, pleasure, or power and this in turn developed the user's sense of agency. Analysis resulted in a gap in the text becoming visible, as negative perspectives on ICT use were notably absent.

Code 12, qualifying teacher efficacy, however, points to a new tension, as expectations of teachers' skills were associated with their ability to facilitate student access to the technology being promoted. In this respect, teacher agency was increasingly dependant upon the ability to demonstrate mastery of new technologies.

In view of the increased sense of agency suggested by the positive dimensions of code five, promoting ICT, the technical difficulties experienced by teachers in the classroom became highly problematic and reflected negatively on teacher efficacy. For this reason, while code twelve, qualifying teacher efficacy, appeared at first to be an insignificant code, its juxtaposition with code five, promoting ICT, articulated an interesting tension. Consequently, qualifying teacher efficacy was also listed under a new category called constructing pedagogy.

4.3.2 Axial coding: School handbook

After the axial coding process had been undertaken with the data from the researcher's journal (Budd, 2008), the dominant categories, controlling ICT, practising literacy, engaging community and constructing pedagogy, were then applied to the open codes for the school handbook (Department of Education Tasmania, 2005). There appeared to be a high level of congruity between the codes, albeit of different dimensions and scope.

Six codes were identified as congruous with the category controlling ICT. These were: code three, offering freedom, code four, promoting ICT, code one, providing access, code seven, qualifying access, code eight, funding access, and code 12, teaching ICT. Although these codes were subsumed under the broader category, they remained distinct in terms of the different data source from which they were drawn. This was important because being

able to relate codes back to their original data source promoted a better understanding of the different perspectives and dimensions they brought to the category.

The category, engaging community, from the researcher's observational journal (Budd, 2008) also proved relevant to the second data source, the school handbook (Department of Education, Tasmania, 2005), as four codes, code five, engaging community, code six, presenting bodies, code 10, delegating responsibility, and code 11, dispersing responsibility, were drawn together to be included under the broader category. While code five, engaging community, and code six, presenting bodies, from the school handbook (Department of Education, Tasmania, 2005) cohered very closely to code three, engaging community, and code four, representing the self, which were drawn from the researcher's journal (Budd, 2008), codes 10 and 11 from the school handbook (Department of Education, 2005) contributed the interesting property of responsibility to the broader category. The concept of responsibility included the following dimensions: delegating responsibility to an individual; sharing responsibility across a group; taking responsibility for the self; and taking responsibility for others.

Code nine, engaging pedagogy, and code 13, teacher qualities, were subsumed under the tentative category, constructing pedagogy. These codes brought together two separate but related properties to construct the more abstract category, constructing pedagogy, thereby articulating the link between teaching theories and teacher qualities. This new category pointed to the concept of teacher efficacy as being dependent upon the pedagogy of the observer and the forms of literacy valued by the culture in which the pre-service teacher was embedded.

After code 14, constructing literacy, was placed under category two, practicing literacy, only code two, changing education, remained. One option was to collapse code one into code nine, engaging pedagogy, as it pointed to positive elements of education that continue within, and work with, the changing context of the online classroom. Code two, however, was maintained and raised to a separate category as a re-reading of the data suggested that this code signified some interesting inconsistencies and tensions regarding the ends and means of education.

Emphasising the need for change, while at the same time acknowledging the importance of valued traditions, required language strategies that negotiate and smooth over any perceived irregularities emerging as a result of the juxtaposition of the old and the new, tradition and innovation. The school handbook (Department of Education, Tasmania, 2005), achieved this by emphasising the comforting familiarity of traditional schooling, offering the same services as other schools, and introducing friendly, caring and helpful staff who work closely together as a community. At the same time, however, the school handbook (Department of Education, Tasmania, 2005) explicitly emphasised difference and change in terms of improved services and improved access and implicitly promoted change through the use of a considerable amount of ICT terminology and technical information.

4.3.3 Axial coding: ICT case study

The eight codes from the ICT case study (Garthwait & Weller, 2005) cohered closely to two of the categories constructed from the first two sources of data, even though the context represented by the ICT case study (Garthwait & Weller, 2005) varied considerably from that of the first two sources. The first two data sources represented a context where lessons were conducted online for the benefit of those students who, for a variety of reasons, did not have access to conventional forms of schooling. The ICT case study (Garthwait & Weller, 2005) represented quite a different scenario of an entire grade of average year seven students and their two teachers, who were all provided with a laptop each. The ICT case study (Garthwait & Weller, 2005) examined the facilitators and barriers in using laptops in the classroom.

Open code one, confronting technology, code five, teaching ICT, code six, promoting ICT, and code seven, providing access, represented student or teacher subjectivities in terms of their increased or decreased sense of agency as a result of the use of ICT in the classroom. These codes were, therefore, subsumed under the category, controlling ICT.

Open code two, teaching efficacy, and code three, qualifying student skills, linked positive and negative aspects of teachers' classroom practice to high or low levels of student engagement and represented those parts of the text that implicitly acknowledged the relationship between teaching and learning. For this reason open codes two and three were subsumed under category four, constructing pedagogy. Open code four, teaching

pedagogy, was implicated in this relationship as it referred to those parts of the text that explicitly juxtaposed and compared the two teachers' classroom practices and highlighted the relationship between teacher pedagogy, ICT use in the classroom and pre-service teachers' interpretations of students' behaviour. In so doing, open code four, teaching pedagogy, also signified the theoretical location of the pre-service teacher and the values that inform their practice. As a result of this threefold relationship, open codes two, three and four were included under the category constructing pedagogy.

Code eight, managing student behaviour, created a coding dilemma. Returning to the initial codes helped to identify two related aspects of the data. One aspect of the open code referred to the need for teachers to develop strategies for controlling students' behaviour as they worked with ICT. This linked the code, managing student behaviour, to the category, constructing pedagogy, as emphasis was placed upon the teacher's classroom initiative. Another element, or group of initial codes, however, referred to the way in which ICT use acted as a form of control over student behaviour. This component of the open code was more closely linked to the category controlling ICT. One property of this category was represented by the open code promoting ICT. Looking at the initial codes that made up promoting ICT very quickly established key words such as engagement and motivation, which explained how ICT played a role in managing student behaviour. For this reason, the code was broken down into its constitutive initial codes and distributed to both categories. Memos were made to highlight this important link between the two categories of controlling ICT and constructing pedagogy.

4.3.4 Axial coding: Pre-service teachers' examination papers

After the axial coding process had been undertaken with the researcher's observational journal (Budd, 2008), the school handbook (Department of Education Tasmania, 2005) and the ICT case study (Garthwait & Weller, 2005), the five categories, controlling ICT, practising literacy, engaging community, constructing pedagogy, and changing education, were then applied to the open codes drawn from the pre-service teachers' exam papers. At the same time, the researcher consciously reappraised the open codes in terms of their constituent initial codes to ensure that the open codes were not forced into the five pre-existing categories.

Axial coding was not used as a process of simple classification. Axial coding was used to identify and make explicit the manifold dimensions, diverse properties and unique contexts out of which a category was constructed and to explore the complex relationships that made these categories mutually dependent.

Keeping in mind the role the ICT case study played in informing and eliciting pre-service teacher responses, the researcher expected that the dominant category constructed out of the ICT case study (Garthwait & Weller, 2005), constructing pedagogy, representing four open codes and 95 initial codes, would influence the focus of pre-service teachers' critique of the ICT case study (Garthwait & Weller, 2005) and their reflections on their experiences in schools. This assumption was supported by the data, with three open codes being subsumed under the category constructing pedagogy: code one, teaching pedagogy, code four, constructing teacher efficacy, and part of code three, managing classrooms.

The other dominant category constructed from the ICT case study (Garthwait & Weller, 2005), controlling ICT, represented five open codes and 51 initial codes. This category drew many responses in the pre-service teachers' examination papers, resulting in the inclusion of code five, promoting ICT, code seven, accessing ICT, part of code three, managing classrooms, code eight, engaging ICT, and code 10, confronting technology.

The remaining three open codes, code six, locating ICT in education, code two, constructing literacy and code nine, determining ICT futures, represented just under a third of the initial codes and, therefore, played an important role in establishing and validating the conditions for meaning making within and across the four sources of data. Code six, locating ICT in education, was included under the category, changing education, because it identified current forms of ICT use in schools. Code nine, determining ICT futures, was also subsumed under this category, because although it represented incidences where statements were made about ICT in society in general, rather than in education in particular, it nevertheless informed pre-service teachers' understandings of what is important in education today, and why. Finally, code two, constructing literacy, was subsumed under the category, practicing literacy, with a memo that stressed the central, but often invisible role this category played in justifying the existence of the other categories. Below is a summary of the axial coding process, linking open codes to their

data sources, the data sources to each other, and to the category under which they were incorporated.

Table 9: Linking categories to codes and data sources

Category 1: Controlling ICT	Open codes: Researcher's observational journal	Controlling ICT (implicit values) Promoting ICT Teaching ICT (explicit value) Confronting technology (enabling/disabling events) Qualifying teacher efficacy
	Open codes: School handbook	Offering freedom Promoting ICT Providing access Qualifying access Funding access Teaching ICT
	Open codes: ICT case study	Teaching ICT Promoting ICT Providing access Managing student behaviour Confronting technology
	Open codes: Pre-service teachers' examination papers	Managing classrooms Promoting ICT Accessing ICT Engaging ICT Confronting technology
Category 2: Practising literacy	Open codes: Researcher's observational journal	Appropriating texts Constructing texts Interpreting texts
	Open codes: School handbook	Constructing literacy
	Open codes: Pre-service teachers' examination papers	Constructing literacy
Category 3: Engaging community	Open codes: Researcher's observational journal	Engaging community Representing the self Identifying bodies Regulating bodies
	Open codes: School handbook	Engaging community Presenting bodies Delegating responsibility Dispersing responsibility

Category 4: Constructing pedagogy	Open codes: Researcher's observational journal	Qualifying teacher efficacy
	Open codes: School handbook	Engaging pedagogy Teacher qualities
	Open codes: ICT case study	Teaching efficacy Qualifying student skills Teaching pedagogy Managing student behaviour
	Open codes: Pre-service teachers' examination papers	Teaching pedagogy Managing classrooms Constructing teacher efficacy

Category 5: Changing education	Open codes: School handbook	Changing education
	Open codes: Pre-service teachers' examination papers	Locating ICT in education Determining ICT futures

4.4 Categories

Looking at the open codes that represented the properties of each category, there appeared to be an overlap of codes across the four data sources. For category one, for example, the open code, promoting ICT, occurred in each data source. There was also repetition evident with other open codes within a category. Reducing repetition and integrating all four groups of data allowed the key properties and dimensions of each category to emerge more clearly as the following table demonstrates.

Table 10: Properties and dimensions of categories

Category	Properties	Dimensions
Category 1: Controlling ICT	Controlling ICT Teaching ICT Providing access Qualifying access Funding access Promoting ICT Confronting technology Offering freedom Engaging ICT Managing classrooms Qualifying teacher efficacy	ICT as central or peripheral learning focus Inclusive/exclusive practices Positive and negative effects of ICT use Increasing and decreasing levels of agency
Category 2: Practising literacy	Constructing literacy: Appropriating texts Constructing texts Interpreting texts	Valued and devalued forms of literacy
Category 3: Engaging community	Engaging community: Representing the self Identifying bodies (are you there?) Presenting bodies (physical) Delegating responsibility Dispersing responsibility	Ethics: Individual or community identities
Category 4: Constructing pedagogy	Constructing teacher efficacy: Engaging pedagogy Qualifying student skills Teaching pedagogy Managing student behaviour	Behaviourism or constructivism: Theories informing human development and purpose
Category 5: Changing education	Locating ICT in education: Changing education Determining ICT futures	Promoting or resisting change

4.4.1 Category one: Controlling ICT

From this point on, initial codes drawn directly from the research data will be presented in italics. While axial coding makes explicit the properties of each category, initial codes continue to be instrumental in representing the properties that make up the category and the dimensions of each property. In this way, the parameters of each category are established more explicitly. In category one for example, the open codes, controlling ICT, and teaching ICT, indicate instances of explicitly and implicitly teaching students about ICT. This signifies curriculum issues, as ICT is discursively constructed as the focus of learning instead of the key learning area (KLA). Examples of explicitly teaching ICT include the initial codes: *advice on internet access*; and *advice on buying computer*. Initial codes that represent the implicit teaching of ICT include: *teacher asks student to focus camera*; *teacher recommends phone instead of computer*; and *teacher comments on five second delay*.

The next property of category one, providing access, documents the dimensions of inclusive and exclusive practices. This property is further informed by the two open codes, qualifying access, and funding access, which tend to foreground those aspects of ICT use that can marginalise individuals and obstruct access to important services and full participation in a learning community. Initial codes constructing this category include: *one large computer lab was always fully booked*; *the classes I have been in only had four or five computers*; and *blocked sites are problematic for teachers doing research*.

The third major property of category one, promoting ICT, represents the negative and positive dimensions of ICT use in the classroom. Additional characteristics of the positive/negative dimension are provided by the open codes, confronting technology, offering freedom, and engaging ICT. The open code, confronting technology, predominantly represents the negative end of the scale, documenting instances of technical difficulty such as lost data, slow network connections, the printer being out of ink and lost passwords. A more complex property, offering freedom, appears at first to represent the positive end of the scale, and a quick check of its constitutive initial codes reveals that this property includes positions of freedom and agency. When considered in relation to the property, providing access, however, this code can also signify various forms of constraint.

The open code, engaging ICT, articulates teachers' understandings of the effect of ICT upon student motivation. Interestingly, motivation is expressed in terms of not only active engagement, but also passive compliance. The last major property of category one, managing classrooms, records references to classroom management issues in terms of the positive and negative effects of ICT upon student behaviour. This is closely linked to the code, confronting technology, as technical difficulties can exacerbate behaviour management issues. The code managing classrooms, is also closely linked to the code engaging ICT, as teachers' understandings of what constitutes positive student learning behaviours informs teachers' use of classroom management strategies. Examples of the initial codes that construct this property include: *boredom is one of the main reasons for behaviour problems so laptops should reduce such issues*; and *students are always excited by new technology*.

4.4.2 Category two: Practising literacy

The category, practicing literacy, incorporates three open codes: appropriating texts, constructing texts, and interpreting texts. This category represents the skills acknowledged and promoted by teachers as evidence of intelligence and social competency. The category, practising literacy, uses the term literacy in its broadest sense, as the data represents a range of teaching contexts, including numeracy, ICT literacy, cultural literacy, and all the subject specific literacies that inform what counts as relevant learning outcomes for the particular teaching and learning subjectivities referred to in the four data sources. Some examples from the data include: *flashing cross means something is wrong*; *my interpretations of icons are, the more ticks, the stronger the agreement*; *everyone's work looks the same*; *students do mindless Google searches and accept answers as knowledge*; and *students' brains retain and reflect information differently than previous generation*.

This thesis has argued that understandings of intelligence are inextricably linked to privileged literacy practices. For this reason, the code, constructing literacy, is also the key property defining the category of the same name, which constructs desirable student and teacher learning outcomes. The dimensions of this code are best illustrated by a few examples of initial codes from the data: *the literate student can make worthwhile contributions to society, enjoy the pleasures of reading and influence decision makers*; *computer illiteracy compounds students learning problems*; *ICT presents a whole new language & range of skills to become proficient in, students gain computer skills yet*

neglect the focus of the lesson; many students have difficulty with traditional tasks; and many students excel at computer skills. These comments implicate the other categories in a number of ways.

To foreground the importance of computer literacy as being instrumental in promoting student development is to make a clear link to the properties of category one, controlling ICT, which identifies issues concerning the role of ICT in the curriculum, access to ICT, promoting ICT as a learning tool, and managing the effect of ICT upon the social dynamics in the classroom.

New literacy practices are also instrumental in constructing new identities and social relationships and this has implications for individuals' understandings of ethical behaviour. Category three, engaging community, raises the important question of ethics in cyberspace. Category four, constructing pedagogy, is directly related to category two, practicing literacy, as teachers' ability to use and promote new technologies suggests a high level of competency in terms of being up-to-date, relevant, in control, and efficient in facilitating student learning.

The other three properties that make up the category, practising literacy, refer to the new literacy practices of students and their teachers as observed during online classes. The code, appropriating texts, records textual practices that undermine traditional conventions. A high level of anonymity encourages the posting of inappropriate comments, icons, doodling and use of abbreviations. The code, constructing texts, however, refers to instances where the contributor is clearly identifiable and chooses to communicate visually rather than verbally. Examples of this include the use of photos, clapping icons, smileys, ticks, crosses, text boxes, arrows and underlining. The code interpreting texts, acknowledges instances where teachers are clearly doing most of the interpretive work, such as: fleshing out brief and often abbreviated text comments; guessing who the contributor is; guessing that a tick means yes, I have had that experience, or yes, I can hear you, or yes, I agree, depending on the preceding remarks; and confusing a student's accidental bump of the mouse with an intention to communicate. In doing so much interpretive work, teachers are effectively re-informing students about the effects and meanings of their use of non-verbal communication tools.

4.4.3 Category three: Engaging community

Category three, engaging community, is constructed from six, distinct but closely related open codes, each representing a different property of the category. The open code, engaging community, from which the category was named, constructs a sense of community by both explicitly and implicitly establishing values and ethical relations. Such comments include: *parent and carers are valued; teachers collaborate; local resources are used; and students work together*. During an online school assembly, or during informal chat sessions, the occurrence of this code was often prefaced with the phrase, *now I'll hand you over to ...*, and a student would be named and given control of the chat session. This creates an important link to the category practicing literacy, because language, meaning and identity are so densely interwoven that who speaks and who hands the microphone on can sometimes communicate more than what is being said. Online, it is not the repeated presence and proximities of bodies, but the repetition of names that establishes a community.

When the body is invisible, community relationships and hierarchies must be established in other ways. The remaining open codes, representing the self, identifying bodies, presenting bodies, delegating responsibility and dispersing responsibility, provide alternative strategies for establishing an online community. The open code, representing the self, is predominantly about embellished or misleading logon names and the posting of personal photos, while the open code, identifying bodies, questions the presence or identity of those who are registered on the logon list on the computer screen. Providing a few initial codes can more clearly explain this property: *Teacher asks students who can hear to put a tick next to their logon name; student asks what we were talking about; and a click on the video camera shows no-one in the chair*. During one online class, the researcher was logged on as a visitor so the word, visitor, was listed among the usual attendees, resulting in the following record in the researcher's observational journal (Budd, 2008): *student asks who the visitor is*. Another time, the teacher directed a question to a particular student but there was no response. In the researcher's observational journal (Budd, 2008), this is recorded as: *no response from student five. Is s/he there?*

When technical difficulties occurred during online teaching sessions, the teacher often asked students to respond with a tick against their logon name rather than with verbal or written responses as these have to be more actively managed from the teachers' end.

Students appeared to have become habituated to responding with ticks and did so even in response to more complex questions such as, *what do you think of that answer?* A tick or a cross in this context would then be interpreted by the teacher as a positive or a negative response and students are effectively able to avoid having to deal with ambiguity by limiting their responses to use of available icons. Some students, however, manage to communicate their uncertainty by posting both a tick and a cross together. Lack of student response causes concern. Teachers ask students if they are experiencing technical difficulties or wonder if the student is absent from their computer terminal. This open code, identifying bodies, is therefore, interesting in terms of its implications for, and link to the category practicing literacy.

The open code, presenting bodies, is a property of the category engaging community that reminds students that bodies are held accountable for the texts produced online. This property refers to the need for physical attendance at certain social events and for meetings with teachers. For the practical purpose of enabling students to identify teachers, photos of staff members are also posted online and these instances are also counted as a dimension of this property. Linked closely to this property are the codes delegating responsibility, and dispersing responsibility. These two properties acknowledge the rules and processes that define a community and keep it together.

4.4.4 Category four: Constructing pedagogy

Category four represents three sources of data and a total of nine open codes. Relating the open codes to each other helps to identify five key properties of the category. In general, this category refers to the personal and professional qualities and skills of teachers as they are described in the school handbook (Department of Education, Tasmania, 2005), the ICT case study (Garthwait & Weller, 2005) and in the pre-service teachers' examination papers. This category, therefore, documents degrees of approval or disapproval for certain types of teachers and teaching practices.

Terms such as potential, motivation and constructivism are used in a number of interesting and significant ways, and agency was frequently ascribed to ICTs rather than to the teacher or the student who were constructed as passive recipients of information. An interesting tension also emerges as a result of pre-service teachers' use of behaviourist and constructivist principles for explaining teacher pedagogy and ICT use.

The property, constructing teacher efficacy, provides the links between the other properties of the broader category constructing pedagogy. The property, constructing teacher efficacy, represents the positive and negative responses of pre-service teachers towards the two teachers, Rick and Susan, discussed in the ICT case study (Garthwait & Weller, 2005). This particular property points to a highly gendered assessment of the two teachers' use of ICT in the classroom. Gendered representations of Rick's and Susan's classroom practices indicate a general expectation of superior male technical competence, and this competence is positively viewed as facilitating students' access to ICT. The female teacher's concern for finding a balance between teaching ICT and teaching subject content is frequently interpreted as a lack of confidence and this is attributed to, what is assumed to be, a low level of technical competence.

The property, constructing teacher efficacy, also articulates the importance of ICT competencies for informing teacher efficacy. The property, teaching pedagogy, is relegated to a position of secondary importance as pre-service teachers arguments focus on ICT as the driving force behind educational change, rather than teacher pedagogy. This signifies the increasing influence of ICT discourses in constructing pre-service teachers' understandings of social progress and the purpose of education.

The remaining three properties are informed by the shifting relationship between teacher pedagogy and teachers' ICT skills. Teachers with strong ICT competencies tend to value and promote those competencies in their students and are seen to be facilitating student access to ICT, an important link to the category controlling ICT. Competency in this respect is often recognised in students using ICT by their high level of independence and engagement. This is recognised by the property, qualifying student skills, which points to students' spontaneous use of ICT as a resource, and their willingness to log on immediately, suggesting that they are motivated to work more quickly and efficiently and require less teacher assistance. The property, engaging pedagogy, supports this understanding of engagement by foregrounding the needs of the individual and the importance of independent learning. At the same time, however, this property sets up an independence/co-dependence tension by stressing the importance of the learning community and social constructivist theories of education while also making the isolation of physical bodies not only increasingly more viable, but also more attractive in terms of classroom management.

The open code, managing student behaviour, is closely related to all properties of this category as only by observing student behaviour can the effects of a teacher's pedagogy be evaluated. Engaged, independent, and motivated students are considered to be indicative of a high level of teacher efficacy, thereby validating the teacher's pedagogy.

4.4.5 Category five: Changing education

Category five is a category constructed from two data sources: the school handbook (Department of Education, Tasmania, 2005) and pre-service teachers' examination papers. The school handbook's (Department of Education, Tasmania, 2005) open code, changing education, contributes initial codes such as: *different timetables; better balanced curriculum; different exciting curriculum; teachers work in teams; and same services as other schools*. In this respect, one of the properties of this category represents the dimension of stability and change as signified by reference to traditional values, such as friendly, caring and helpful staff, and innovation. Change is constructed as a positive element and newness is exciting and motivating as it encourages students to go to year 10 and beyond.

The open code, locating ICT in education, contributes the property of current forms of ICT use to the category, changing education. ICT use is constructed along two dimensions: firstly, what ICT should and should not be used for, and secondly, what ICT use might look like in terms of present and future classroom practices. Some examples of what ICT should and should not be used for include the following initial codes: *computers do not teach, teachers do; if you can be replaced by a computer, you deserve to be; ICT should support not replace traditional education; ICT should be used in each [teacher education] method program to model cutting edge delivery of teaching and learning; and teachers must be constantly aware and in training for these [ICT] changes*.

The second dimension of present and future ICT use in the classroom can be illustrated using the following initial coding examples: *ICT is used for quick research problems; ICT is used for final copies; ICT is used for simulations; ICT is used for music; ICT is used for games; ICT is used for personal diaries; including ICT in instruction allows students to access knowledge and gain deeper understanding of how ICT works; every student having a laptop is rare, but this will change in the future; it is my belief that with the implementation of laptops the ultimate aim and purpose would be to create an almost*

paper free school; and as generations progress more students will be suited to this learning style.

The second open code subsumed under the category, changing education, from the pre-service teachers' examination papers is, determining ICT futures. This open code represents the broader property of ICT's place in society and the dimensions of this property signify the level of control the individual has over technological development. Examples of the initial codes that dimensionalise this property include: *computers are becoming a fact of life; ICT will become cheaper and more useful and a necessity; one day everyone will be at a desk with a computer and no pens; as generations progress more students will be suited to this learning style; as technology advances it is important for students to become proficient in ICT so they don't get left behind; this dependence will increase exponentially over the student's lifespan; and, more than ever humans depend on technology.*

While the one open code, changing education, from the school handbook (Department of Education, Tasmania, 2005) was interesting there was insufficient information from this one data source alone to build a deeper understanding of its relation to the other four categories. On reading the pre-service teachers' examination papers, however, this code became so complex that coding relationships within and across categories threatened to produce an overwhelming and impenetrable density.

4.5 Theoretical coding

Relationships between and across properties and categories are densely interwoven, and what is produced as a result is much more than the sum of its parts. Theoretical coding is an important step that ensures that the relationship between categories and their properties is explored and developed as part of a transparent and explicit move from practice towards the development of theory. Theory is defined here as a level of abstraction that accounts for all the categories constructed as a result of the grounded theory process. In this respect, theoretical coding is a similar process to axial coding, as it is also an integrative and interrogative process. The key difference between axial and theoretical coding is in the level of abstraction.

This research framework is informed by feminist poststructuralist theory (Weedon, 1987), which acknowledges the role of language in the production of social reality, the significance of the body as the site of language production, and the relationship between the two in constituting and sustaining unequal power relations (Phillips & Jorgensen, 2002, Weedon, 1987). For this reason, theoretical coding is informed by Carabine's (2001) Foucauldian critical discourse analytic framework.

Selective coding is used in this research to delimiting coding and to focus on those categories that relate closely to the core category, or categories, that form the heart of the emerging theory (Dey, 1999). The core category is the central phenomenon around which all other categories are integrated. The privileging of one category can, however, be misleading under some circumstances (Dey, 1999) as it can distort relationships and encourage a one-dimensional analysis of the emerging theory. For this reason, the term theoretical coding is used in this study to avoid constructing a storyline divorced from the theoretical underpinnings that make it possible to unpack the production of social reality in the first place. To do so as part of feminist poststructuralist praxis would be to claim a position outside the discursive structures. This research relates theoretical coding back to Carabine's (2001) Foucauldian critical discourse analytic framework for the purpose of: identifying the discursive strategies and techniques; understanding how the discourses identified are given meaning and force; and critiquing the effects of the discourses identified in constituting knowledge/power relationships. Philips and Hardy (2002) write:

Introducing the idea of a discourse, in addition to text and context, provides the critical dimension that allows social construction to be understood. It is not individual texts that produce social reality, but structured bodies of texts of various kinds – discourses – that constitute social phenomena. By examining the nature of a discourse, including the methods of textual production, dissemination, and reception that surround it, we can understand how the concepts that make social reality meaningful are created. (p. 82)

4.6 Conclusion

This chapter has demonstrated a constructivist grounded theory approach (Charmaz, 2000, 2006) to the analysis of data. Phases of the analysis demonstrated in this chapter include: initial coding, open coding and axial coding. The construction of codes and categories has been undertaken with an awareness of the importance of reconstituting data in a

meaningful way; that is, with an understanding of the research contexts and theoretical frameworks within which the data was drawn and interpreted.

The next two chapters interrogate the categories in relation to the research question. Chapter five presents the findings of the research by explicating the discursive strategies and techniques used across four of the five categories as they are informed by the literature reviewed in chapter two of this thesis. Chapter six uses the fifth category, changing education, to relate all the categories together. Both chapters, five and six, discuss the effects of antagonistic rationalities upon pre-service teachers' understandings of ICT in education.

Chapter five

ICT discourses: Strategies and effects

5.1 Introduction

This chapter makes visible the discursive techniques and strategies used by pre-service teachers to articulate their understandings of ICT in education, thereby explicating the ways in which pre-service teacher subjectivities and ICT practices are constructed at the nexus of educational and ICT discourses (Phillips & Hardy, 2002). While the previous chapter demonstrates the use of constructivist grounded theory (Charmaz, 2000, 2006) for establishing the key categories and relationships that represent the often invisible work of texts in constructing and informing the rationalities that authorise dominant discourses, this chapter discusses how pre-service teachers draw on dominant discourses to legitimise their teacher subjectivities and classroom practices. Pre-service teachers' voices are represented in italics throughout this chapter and are frequently grouped together to demonstrate the multifarious discursive techniques and strategies used to construct a range of pedagogic perspectives on ICT practices in education. In such groupings, individuals' comments are separated by a semi colon.

This chapter begins by discussing Foucauldian critical discourse analysis (Carabine, 2001) as a form of theoretical coding. In constructivist grounded theory (Charmaz, 2000, 2006), theoretical coding is a process that makes explicit the theoretical perspectives used to inform the significance of the findings. In Foucauldian critical discourse analysis (Carabine, 2001), however, categories are renamed as discourses for the purpose of separating and shifting the focus from the development of categories to their analysis within a feminist poststructuralist critical framework.

The order in which the discourses are discussed in this chapter does not represent a hierarchy of discursive techniques or strategies, as discursive boundaries and relationships are fluid, indeterminate and dependant upon context and purpose and represent the unique perspectives of individual subjectivities. Nevertheless, the discourse of progressive bodies, drawn from category one, controlling ICT, has intentionally been presented first to foreground the importance of the body as a site for meaning making. Understandings of nature, knowledge and human progress are informed by readings of the body, and this

thesis has argued that a range of epistemic practices, most notably those promoted by the sciences and cybernetics in particular, have constructed and promoted the cyborg as the body of the future. Like the normative body, the cyborg metaphor marginalises those individual corporealities that struggle to incorporate, or embody, cultural ideals due to constructions of gender, race, ethnicity, disability and other signifiers of difference.

Informed by the discourse of progressive bodies, the discourse of posthuman pedagogy, drawn from category four, constructing pedagogy, examines the effect displaced corporealities and disembodied subjects have on the construction of teaching and learning subjects. This is followed by the discourse of interaction, drawn from category three, engaging community, which discusses the ethical implications of new bodies and new social relationships. Finally, the discourse of literacy, drawn from category two, practising literacy, examines the new literacies promoted by pre-service teachers ICT practices.

The discursive relationships within and across these four discourses support the fifth discourse, the discourse of changing education, drawn from category five, changing education, which will be discussed in the concluding chapter as it re-engages with the contradictory politics of literacy, and the research question of pre-service teachers' understandings of the role of ICT in education.

5.2 Critical discourse analysis as theoretical coding

Foucauldian critical discourse analysis (Carabine, 2001) is used in this research to identify discursive possibilities for increasing teacher agency. Such a framework anticipates the need to understand the way in which discourses “ensure that certain phenomena are created, reified and taken for granted and come to constitute a reality” (Phillips & Hardy, 2002, p. 21), and aims to make visible their political ramifications.

Foucauldian critical discourse analysis (Carabine, 2001) seeks to unmask not only the privileges maintained and legitimated by particular institutional discourses (Phillips & Hardy, 2002), but also the constraining effects that function as modes and techniques of social control. Use of Charmaz's (2000, 2006) constructivist grounded theory to “generate categories from empirical data” (Phillips & Hardy, 2002, p. 10) has been demonstrated in chapter four of this thesis. Constructivist grounded theory (Charmaz, 2000, 2006) on its own, however, does not problematise the findings by questioning what passes for truth

and how particular truths are established within institutional contexts such as education. Consequently, critical discourse analysis is used in this thesis to contribute to an understanding of the power/knowledge networks and hierarchies underlying pre-service teachers' articulations of ICT practices in education.

Four of the five categories constructed through a constructivist grounded theory (Charmaz, 2000, 2006) analysis of the research data are discussed in the following four sections of this chapter as interrelated strategies or sub-discourses that work together to support a broader discursive regime. Reconceptualising and critiquing the four categories as discourses means that the focus of discussion will no longer be on the production of categories but on the cultural, social and political effects of those categories upon embodied subjectivities. The discursive strategies and techniques discussed here represent the findings by providing an account of how language works to produce cultural norms, values and beliefs, challenge or maintain power/knowledge networks, authorise pre-service teachers' pedagogies, and construct the role of ICT in education.

5.3 The discourse of progressive bodies: Constructing cyborgs

The discourse of progressive bodies utilises cyborg metaphors to construct the future potential of human beings. The cyborg represents an increased dependency of bodies on technologies, as a symbiotic human/machine relationship promises enhanced performance through greater reliability, increased control over social interactions, access to new and liberating spaces and faster information processing abilities. Consequently, the discourse of progressive bodies constructs the role of ICT in education as providing not only a means through which education is practised but also an end in itself, whereby corporeal resistance to normative discourses is subjugated by the technologies of its own making. Symbiosis represents the discursive dismantling of the corporeal subject as a unique and autonomous unit, and signifies its reconfiguration as a technologised subject, reduced to informational patterns that can be codified and represented in machine-accessible form.

This section makes visible the discursive techniques used by pre-service teachers to align educational theories with the posthuman worldview. This thesis has argued that educational goals and outcomes are implicitly linked to various ideological perspectives,

teleological arguments and socio-cultural contexts that inform understandings of what a human being is and what social progress means. One technique of the discourse of progressive bodies is to promote the integration of ICT across the curriculum by positioning it as a new literacy. Another technique is to foreground the use of ICT to promote inclusive educational practices, thereby making access to ICT an ethical imperative in schools. Two key issues linked to inclusion include funding and gender. The third technique assesses the efficient student/worker in terms of productivity, speed, freedom, creativity, and engagement, and argues ways in which ICT can improve student learning outcomes. The fourth technique constructs ICT as an effective tool for classroom management, as pre-service teachers argue that learning with ICT is argued to be authentic learning, resulting in increased student engagement and, therefore, fewer classroom management issues. These discursive techniques work together to construct new, ICT related literacies as highly relevant to students' lives both in and out of school and essential for ensuring their socially productive futures.

5.3.1 Controlling the curriculum

The curriculum represents those social practices and forms of knowledge that are considered essential for the development of a productive and functional social being: someone who is able to contribute positively to the established social order. The language used to construct an understanding of the aims and purposes of the curriculum indicates the values promoted by powerful discourses and taken up by pre-service teachers.

The first technique used by the discourse of progressive bodies constructs ICT as having a foundational and integrative role in the curriculum. Pre-service teachers write: *ICT in the curriculum is highly valued; Education, particularly in Tasmania has increased its value on integrating the curriculum ... ICT provides opportunity for this; ICT is increasingly integrated into the rest of the curriculum.* ICT also offers support to teachers by providing information resources for their subject area: *ICT is a perfect tool for teachers to use to enhance learning.* Furthermore, pre-service teachers argue the benefits of ICT software for manipulating, demonstrating and learning that information: *Students should learn with computers, not from or about computers; Computers should be exploited to develop deep understanding; There is no more or less work with ICT, only different skills and thinking.*

The discursive technique that constructs ICT as an integrative and integral medium for teaching and learning, while accepted and used by teachers, creates a considerable amount of confusion and tension in their practice as the role of ICT in the curriculum takes on a central, an integrative or a peripheral learning focus, depending on the supportive discourses that give any text a context. In pre-service teachers' comments, the names Rick and Susan refer to the two teachers in the ICT case study (Garthwait & Weller, 2005): *Expenditure of time acquainting students with ICT operations should not be an issue of concern; Susan found laptops can divert the teachers and students away from the topic; Students would gain computer skills yet neglect the focus of the learning experience.* The first notable tension exists between the teaching of ICT and the teaching of key learning areas such as mathematics, science and English. Interestingly, one pre-service teacher explicitly acknowledges a subject hierarchy in the curriculum, pointing out that the hard sciences such as mathematics, physics and chemistry are privileged over those areas of learning categorised as soft sciences: *Subjects such as maths also have such a high curriculum and need good brain power that I feel computers only hinder this sort of subject. Science, music, art subjects though can benefit greatly.*

Hegemonic discourses encourage pre-service teachers to assume a white, male perspective on the place of ICT in the curriculum (Anderson, 2007; Spender, 1995). This perspective values positivist knowledge frameworks such as that represented by the term hard sciences (Leane, 1999). Gendered understandings of ICT practices cause some confusion and tension for pre-service teachers because while the study of ICT can be seen as a hard science, ICT's various applications include communicative and artistic endeavours associated with the soft sciences.

Unquestionably, as one pre-service teacher points out: *ICT has many different applications.* Furthermore, as a literacy, ICT becomes an integral part of any curriculum. As a teaching tool, however, ICT can be compared to other devices such as the whiteboard or television and takes on, as a result, a more peripheral role. How ICT is used and taught impacts on its place in education as a subject area in its own right, an innocent teaching tool, a justification for the teaching of new literacies or multiliteracies (Cope & Kalantzis, 2000), or as an integral and integrative element that influences the direction and delivery of the curriculum. What is available online, for example, can inform the content of the subject area, so that web resources or software can function as a guide for teaching subject content: *If students need urgent teaching in an area then this should be provided without*

worrying about wasting class time ... I believe class time is never wasted if students are learning even if not on the required topic.

Teachers not only explicitly pass on ICT skills and understandings to their students as part of the curriculum, but also implicitly pass on their values and attitudes towards ICT. This phenomenon, referred to as the hidden curriculum, involves:

The learning of attitudes, norms, beliefs, values and assumptions often expressed as rules, rituals and regulation. Taken as a whole these learnings can be termed the common-sense knowledge which we, as members of a given society, take for granted. As such, they are rarely questioned and often remain unarticulated. (Seddon, 1983, p. 2)

Pre-service teachers cite many instances during their school experiences where the focus of learning, when ICT is in use, is directed away from the key learning area. In these situations, the learning emphasis shifts away from the key learning area to the manipulation of programs or search engines that determine how information is best accessed, stored and used: *It would be an advantage to implement at the start of each lesson work on technical skills; I spent more time helping certain kids to use the mastering music program than helping them with the content they were supposed to be learning about.*

Continually turning to ICT for answers, or for the purpose of making learning processes easier or more attractive, limits pre-service teachers' ability to recognise alternative possibilities for classroom practice. Stoll (1995) ponders how the constant use of ICT across the curriculum might alter thinking processes when he writes "When the only tool you know is a hammer, everything looks like a nail" (p. 45), concluding that, "the medium in which we communicate changes how we organise our thoughts" (p. 46). One pre-service teacher makes a similar point, writing: *The introduction of technology into a school requires a change of belief from everyone involved.* The same argument applied to ICT in education encourages the belief that, if ICT makes learning processes easier and is the most up-to-date, innovative educational tool, then the teachers who use it are correspondingly up-to-date and innovative. Pre-service teachers support this view when they critique the classroom practices of Susan and Rick, the two teachers discussed in the ICT case study (Garthwait & Weller, 2005). Susan is described as using ICT selectively and with specific outcomes in mind, whereas Rick uses it as much as possible: *It appears*

Susan is holding on to a pre-ICT concept of relevant curriculum; Rick is in tune with current trends in education across the curriculum.

Pre-service teachers' argue that when ICT is used to teach a new concept in their key learning area, the new concept is secondary to the computer skills required. Often technical difficulties must first be overcome in order to access and manipulate the program that teaches subject content. Explaining a 5 minute delay between video and audio is useful for developing students' understanding of how sound and image are bundled and sent, but such interruptions can also break the productive flow of a lesson and undermine student focus and concentration.

In the field, the researcher noted that, regardless of the key learning area being taught with ICT, learning was often interspersed with ICT terms and instructions. The constant reiteration of ICT terminology had the effect of forming a background noise that presents itself as the underlying fabric of the subject area: *Technical problems dominate the organization and running of classes*. The constant use of computer terminology justifies, to some degree, pre-service teachers' references to the integrative capacity of ICT in the curriculum, even though they neglect to clarify which fields of endeavour are being integrated and for what learning outcomes and purposes.

The same claim could be made for the integrative capacity of literacy across the curriculum. Not all teachers, however, are literacy experts, and it may seem unreasonable to recommend the teaching of English literacy skills in mathematics or science classes. Not all teachers are ICT experts and yet, the teaching of ICT literacy across the curriculum does not draw the same kind of resistance. Pre-service teachers' focus on ICT for integrating the curriculum and making learning relevant for students is based on the assumption that ICT is the privileged literacy, confirming the implications of McLuhan's (1964) claim that "the medium is the message" (p. 7). The medium influences how literacy is perceived by privileging certain forms of meaning-making practices over others, redirecting focus, and shifting values. For pre-service teacher development, this means that the importance of understanding broader categories of literacy, such as critical literacy, is undermined.

5.3.2 Controlling access

Providing access to ICT has become a primary focus of education and represents a commendable trend that emphasises the need for a more inclusive education system. To establish ICT as a curriculum essential both explicitly and implicitly is to foreground the importance of providing students with access to ICT as a form of inclusive practice: *Computers are inclusive of students because they give instant feedback on progress; More inclusive as computers can cater for the needs of a range of learners; If a computer is used as a tool for learning and there are a variety of different resources that meet the learning needs of others then it is a very inclusive tool .*

According to data drawn from the school handbook (Department of Education, Tasmania, 2005), access to ICT is provided to ensure an equitable and inclusive education system. Online learning represents a system that caters for isolated, rural or small schools, those who are sick, bedridden or otherwise disabled, for home educators, travellers, pregnant women, the gifted, isolated individuals and those in exceptional circumstances. ICT can also enhance student learning by: improving students' educational outcomes and their social connectedness; ensuring the smooth progression along educational pathways; and offering a diversity of online coursework in a flexible manner so as to accommodate the changing working hours and lifestyles of the individual.

In each of these situations embodiment is constructed as a problem. The body's physical constitution or location hinders access to others and to information: a problem that can be overcome through the use of ICT. For this reason the majority of pre-service teachers believe that providing students with access to ICT is an educational priority: *In an ideal world every student has access to a computer.*

While the ICT case study (Garthwait & Weller, 2005) used in the pre-service teachers' examination refers to ubiquitous computing and "the provision of laptops for every student" (p. 1), the school handbook (Department of Education, Tasmania, 2005) for online education discusses more practically states for whom, for what purpose, why and how ICT access is provided. The school handbook (Department of Education, Tasmania, 2005) refers to the demonstration of appropriate students' skills and personal qualities as a prerequisite. It states that the student must have the appropriate skills and personal qualities and or support, but the question of who decides what constitutes appropriate

skills or personal qualities and how the appropriate support might be provided remains undefined.

Pre-service teachers' reflections on their school experiences, identify a range of non-inclusive ICT practices: *Schools limit access; Only five computers in a class of twenty-four; One large computer lab always fully booked; Only one printer in room so students had to wait; Poor availability makes it hard for students to finish work started on ICT; Not all students have access to computers at home.* Pre-service teachers' reflections on their experiences of ICT access in schools raises a number of important issues and introduces a complex problematic that foregrounds individual corporealities and their representation, or lack of it, in ICT and educational discourses. Non-inclusive practices foreground the importance of considering embodiment not only in terms of the more openly discussed issues of disability and socio-economic disadvantage, but also in terms of age, as one pre-service teacher writes: *For some old teachers, they have very little ICT knowledge, which becomes the biggest problem as they cannot give children clear instructions or guidance.*

5.3.3 Controlling gender

It is gender, however, that presents a complex dilemma for many pre-service teachers as they discuss the relationship between gender and ICT: *Gender difference in computer use; From my observations some students (boys in particular) dominated the use of the computer ... some girls felt intimidated; Females generally find computers too technical ... software appropriate for girls are necessary; [ICT implementation] fails on a large scale... particularly given the demographic profile of the teaching profession in Australia, predominantly women in their 40-50s; Susan is probably an older lady.*

Gendered interpretations of the ICT case study (Garthwait & Weller, 2005) produced only three negative comments on Rick's teaching practice. These criticisms referred to Rick as being less reflective than Susan and showing little evidence of any planning sequence or clinical observation for assessment purposes. Susan, on the other hand, drew 87 negative responses including the following: *[Susan's] view of what content should include may illustrate a conflict with the emerging ICT paradigm; [Susan] may not have had as many issues with ICT if she had embraced the idea of spontaneity; [Susan shows] deficiency in computer knowledge; [Susan] did not have an easy relationship with ICT; [Susan has]*

questionable ICT competency; [Susan has] a limited and narrow view. Other negative descriptions of Susan include: Not happy; Not spontaneous; Has technical issues; Struggles to find good websites; Is too subject oriented, Needs encouragement; Feels unsupported; Is less committed; Is sceptical, Is controlling; Struggles with too much information; Overlooks ICT potential; Too cautious; Unrealistic; Negative; Too much planning; Not enough planning; Frustrated; Unwilling to adapt to ICT paradigm; Has a less productive class; Less confident; Could improve; Irrational; Needs to structure instructions; Needs to increase group work; Not up to date; Not authentic: No interaction; Apprehensive; Rushed students; Caused many problems by her attitude; Missed opportunities for critical literacy; Under pressure: Stressed; Creates own problems; Students are bored and disengaged; Overly concerned about the curriculum; Passive; Uses behaviourist approach; Uses IT as an extrinsic motivator; Has behaviour management issues; Focuses on small issues; Practice is not built on sound theory.

The ICT case study (Garthwait & Weller, 2005) mentions that Susan had enrolled in a graduate course on using laptops for teaching, and had agreed to be the lead teacher in the Maine Learning Technology Initiative program. Nevertheless, she was criticised 13 times by pre-service teachers for having questionable ICT competency and nine times for not using ICT to her advantage. In addition, Susan was criticised seven times for losing or wasting time, even though the lost time was due to technical issues such as slow Internet connections and inaccessible printers, or represented the time she had spent outside of class time, searching for web sites with suitable content, correct spelling and grammar, up to date web links, appropriate degrees of difficulty for the range of reading abilities in her class, always with the state learning standards in mind.

The role gender plays in constructing understandings of technological competence is powerfully demonstrated in pre-service teachers' responses to the two teachers in the case study. Leech (2007) confirms that:

Teachers are subject to the same social and cultural constraints and responsibilities as their students ... Teachers, like their students, then, grapple with social and cultural constructions of gender in relation to technology, which always already position women as less confident and competent than their male peers. (p. 8)

The issue of gender is also evident in the ICT case study (Garthwait & Weller, 2005) itself. Although the ICT case study (Garthwait & Weller, 2005) does not present ICT

competency as an issue for either of the two teachers, it does state Rick's higher ICT qualification, a recent Masters in Instructional Technology. Furthermore, although the comment on Susan's family life, "holding family life as a high priority, she had delayed her career until both her children were school-aged" (Garthwait & Weller, 2005, p. 2) was considered relevant to the case study, neither Rick's experience with children nor his opinions of family life required any commentary. In addition, although Susan accepted the time consuming position of Lead Teacher, supporting the training efforts of the state's ICT initiative, this contribution was tempered by pointing out that Susan did not volunteer for the position of Lead Teacher but only agreed because she had been "bolstered by repeated reassurances" (Garthwait & Weller, 2005, p. 4). The fact that her voluntary involvement in the training program tapered off drew many negative comments from the pre-service teachers, who criticised her lack of commitment. There was no criticism or questioning, however, of Rick's lack of involvement with the voluntary program, even though he is perceived to be better qualified to assist other teachers than Susan.

Since 1992, the representation of women, in proportion to the number of men, studying computer sciences and related fields has continued to decline in spite of attempts to increase the amount of time girls spend on computers, and in spite of studies that indicate that girls demonstrate equal competence with boys (Anderson, 2007). The increasing gap in gendered representations of ICT proficiency is acknowledged by Cabrera-Balleza (2008):

The ICT industry employment landscape is male-dominated. In general, women work at lower levels and are relegated to data entry, word processing and transcription work. This is reflective of the ICT education and training patterns where young women tend to be the large majority of those enrolled in office application computer courses, but a small percentage of those studying programming or computer engineering. (p. 6)

As ICT is seen to play a crucial role in a knowledge-based economy, society is the poorer for the lack of diversity that could enrich its disciplines and broaden their social relevance (Lang, 2003). The irony of women's complicity in maintaining gendered technologies is not lost on Bryson and De Castell (2007) who write:

Femininity eschews tool-use, and yet is enacted by the skilled use of domestic technologies – sewing machines, washing machines, vacuums. These tools are no less complex than cellular phones or computers, and yet, paradoxically, to be able to use them is to embody a gendered identity as technologically inept. (p. 5)

In pre-service teachers' interpretations of Rick's and Susan's use of ICT in the classroom there are many anomalies, contradictions and generalisations that require further investigation. The same can be said of pre-service teachers' observations during their school experiences: *Males find it easier to play around with computers while females generally find computers too technical for their likings*. Unfortunately, an in depth discussion of gender related ICT issues is beyond the scope of this research study. The matter of gender, nevertheless, remains an important piece of the larger jigsaw that informs pre-service teachers' understandings of ICT practices in education. This foregrounds the need to keep in mind how the gender, age, race, location or dis/ability of individual corporealities can determine the discursive rationale available for the explanation of ICT attitudes and practices.

5.3.4 Controlling funding: Constructing peripheral bodies

The issue of funding creates another tension in the argument for increasing student and teacher access to ICT. In the school handbook (Department of Education, Tasmania, 2005) those students who do not fit the criteria for financial assistance for participation in the school's online learning program are charged on a fee for service basis. Although public school principals can decide to use cluster group funds, the school handbook (Department of Education, Tasmania, 2005) warns that the continued viability of these funds is currently under discussion. Rules and regulations cannot account for every contingency so that many individuals fall through the gaps in this discourse. In most of these instances inclusion or exclusion is linked to the problematic nature of embodiment.

The need for appropriate local and regional infrastructure is also dependent upon the funding priorities of the broader school community. Pre-service teachers complain that computer labs are fully booked and often considered the domain of a small cohort of teachers. Alternatively, computers are scattered across classrooms in groups of four or five for classes of up to 26 students, creating difficult classroom management issues. Printers also pose a problem, not only in terms of availability but also accessibility. The location of printers is rarely determined by the teachers but by specialised ICT or administrative personnel: *I worried about the fact that students needed access to the colour printer located in the staff room, a place normally off limits to students and far from the classroom out of sight*.

Funding computer supplies, such as ink and paper, replacing, maintaining and upgrading hardware and software, and employing ICT specialist is a large expense for schools. One pre-service teacher noted that lack of funding in the area of computer resources in public schools generally signifies a lack of resources in other areas: *Money for such projects can take away budget money for other essential learning resources*. Funding used to promote the need for, or visibility of, computer technologies in schools, however, effectively makes invisible the deficiencies in other areas of public education. Stoll (1995) writes:

The state of North Carolina spent seven million dollars to tie sixteen high schools with a fiber-optic network. It's one of those high-visibility experiments that attracts politicians and professional education consultants ... I'm wondering how many teachers they could hire and how many books they could buy for seven million dollars. (p. 116)

The possibility of using funding for reducing class numbers to provide more one-on-one time with the teacher is quickly overshadowed by the promise of new technologies. The implication here is that students need to spend more time with ICT, not more time with their teacher. Nevertheless, pre-service teachers describe the current situation, in public schools at least, as a struggle to ensure large classes have equitable access to the four or five computers available in the classroom.

5.3.5 Controlling production: Constructing efficient bodies

The discursive technique of constructing ICT as an integral element of any curriculum and promoting ICT access as the key to an inclusive education system is not the only means of raising the profile of ICT in education. Another discursive technique suggests that ICT use improves students' learning outcomes by increasing student productivity and improving students' higher order thinking skills.

The first of these discursive techniques identified in the data is the promise of increased classroom productivity. Rick's unbounded enthusiasm for ICT contrasts starkly with Susan's more critical appraisal of its use in the classroom and appears to justify more than one pre-service teacher's assumption that: *[Rick] has a more productive class*, and another pre-service teacher's assumption that: *[Susan] has a less productive class*. No supporting evidence, apart from references to the use of ICT by the student, is provided.

Providing access to information is currently touted as the key to a socially productive life. The question as to what constitutes increased student productivity, however, is fraught with contradictory claims. The need to increase student productivity is informed by powerful economic and administrative discourses that measure productivity in terms of volume of input, time saved, speed of processing and volume of output. Knowledge is treated as a commodity and students are taught how to package and sell their product. To suggest that ICT increases student productivity is, therefore, to suggest that students or teachers are working faster and smarter to produce more. This rhetoric promotes a quantitative approach to knowledge that values not the depth, complexity and creativity of a student's use of information, but the ability to standardise and measure student products in order to demonstrate high levels of accountability to stakeholders. This understanding of student productivity represents the perspective of "technologists ... whose avowed goal is to make schooling more efficient" (Hodas, 2006, p. 205). In this respect, for some at least, the role of ICT in education is to ensure efficient processes, which means the delivery, processing and storage of as much information as possible in the shortest space of time. "This fits well into the rationalist model of the school as factory and the technologists' goal of maximizing instructional delivery" (Hodas, 2006, p. 212).

Pre-service teachers argue that students must be motivated to work more productively, and many pre-service teachers gauge the level of student motivation by their level of engagement in an activity. The key arguments pre-service teachers use for justifying or making unproblematic claims of increased student productivity resulting from ICT use are constructed around the two key terms: motivation and engagement. Other factors used by pre-service teachers to back up their claims of increased student motivation and engagement include: fun, enjoyment, interactive, creative, new, instant feedback and relevance. The following pre-service teachers' comments provide a range of positions on student motivation and engagement: *Teachers would acknowledge world wide that computers engage students more artistically, academically and also personally; [Students are] engrossed in a manner similar to the way they would be at home watching TV; Is this [increased independence] by the improvement in teaching delivery or just because students have more to keep them entertained or distracted?; The students were not more motivated to do their music theory but simply to use the technology; ICT increases student motivation and engagement; Teachers can use the ICT to engage, tune in, the students; Students enjoy seeing their work being produced with better graphs, cool fonts etc;*

Computer engages student by giving instant feedback; ICT permits interactive engagement; One laptop per student would encourage them to enjoy learning and see the relevance of it once they have finished school; They enjoy learning new applications; ICT may give an impression of productivity but many students are still disengaged; ICT motivates and is more fun; ICT allows students with different learning styles to engage more adequately; ICT assists students in the presentation of work; It's what they relate to it's the technological age.

The positive dimension of the category, ICT for increased productivity, promises increased student engagement and motivation, access to the information superhighway, and student empowerment through increased personal freedom. The argument supporting increased student productivity through ICT use is a powerful one that is rarely if ever challenged. To say that ICT is an interactive, enjoyable, creative online learning environment that is highly relevant to students' personal lives, and that it saves time by enabling quick access to and efficient handling of information is to expect increased student motivation and engagement and therefore increased student productivity.

Increased classroom productivity resulting from ICT use is linked closely to other positive concepts such as freedom, efficiency and engagement. These concepts in turn are linked closely to the fast capitalist rhetoric (Gee & Lankshear, 1997) of constant change and the need for accelerated rates of production and consumption. The metaphor of the information superhighway combines the first three concepts by suggesting that you can go further, that is, access more information, faster and with less effort: *Susan believed computers would be useful for speeding up activities; Students see research as easier because they don't have to go to the library; Rick found that students were more efficient, engaged and worked faster; Computers and Internet also save time when preparing for a lesson, there's less running around and writing up what needs to be done with a pen and paper.*

The metaphor of the information superhighway promises fast access to information and represents, therefore, a highly efficient social network. For educators, this means up-to-date technology can open up new learning pathways and facilitate students' instant access to, and use of, information: *Students are always keen to do a Google search and find out information; ICT allows students access to different sources of information.* The irony of the highway as a metaphor for freedom and efficiency, however, is that a highway can be

both a means and an end in itself. For some, a highway is just a means of getting from point A to point B. For others the highway is not about the destination at all but about providing the experience of speed and freedom, the fast getaway vehicle, freedom from the resistance of enclosed spaces, freedom to be everywhere and yet paradoxically nowhere at the same time. As an end in itself, the information superhighway becomes a liberating space, an escape from the resistance of regulated, institutional spaces, from the inertia of physical bodies and from the demanding civic responsibilities such spaces and bodies represent. Students who are too focused on speeding around on the information highway can see surfing the web as an end in itself, an escape from the demands of the classroom: *Do students see the use of computers as a bludge lesson? ... this has been my experience ... I have observed many students off task when using computers or simply not doing a lot at all.* Without clear structures, students can lose their sense of meaning and direction in learning. The end result experienced by pre-service teachers is that students enact freedom in learning through riding a wave of “information trivia, which has the effect of placing all information on an equal level” (Postman, 1992, p. 137).

5.3.6 Controlling freedom

Antithetical to the notion of access and freedom is the need for greater control mechanisms. A negative outcome of ICT use, as described by pre-service teachers, is decreased student engagement in the key learning area. This is due to either increased student passivity or subversive activity, ironically resulting in the need to limit student access and increase student supervision. Examples of off-task behaviours associated with ICT use and resulting in lost time include aimless Internet browsing, playing with fonts and colours, and abuse of email privileges. Some pre-service teachers question the nature of student motivation and engagement with ICT use by looking more closely at how ICT changes what students do: *The computer is actually doing some of the work for them ... cut and paste; Individual laptops ease boredom.*

Accompanying ICT's promise of freedom on the information superhighway, however, is the paradoxical demand for increased surveillance over and control of students as they work and communicate online. This is due to the presence of pornography, racism, product marketing, pirating, plagiarism, and viruses which threaten to infiltrate and undermine the integrity of student work and school web pages.

Speeding up processes saves time and extra time means more freedom, but in some classrooms more time and freedom is tempered with the additional possibility of more opportunities for irresponsible student behaviour. One pre-service teacher writes: *I like the idea of a free environment in which learning occurs*, while other pre-service teachers complain that: *Subversive activities easily indulged by student; Students copy and paste without rewording or reinterpreting; Students copy and paste without references and claim as their own work*. Students may feel a false sense of independence, competence and productivity when they plagiarise entire paragraphs and produce an impressive literary bricolage from a number of different websites.

On the positive side, this type of subversive behaviour does demonstrate some useful literacy skills such as web navigation and the use of search engines, word programs and toolbar options. In this respect, ICT is an empowering medium for the student who is able to produce a substantial and well presented piece of work. While student's appreciation and understanding of a number of important literacy skills may have been undermined as a result of cut and paste activities, their sense of achievement through the production of a professional-looking text can provide immediate gratification and, therefore, be highly motivating for students.

ICT empowers and motivates students as: *Able students can work at faster pace*. Other students find they are empowered by the technology as they teach teachers or other students how to use ICT. One pre-service teacher, however, observed that: *Students of lower abilities struggle to stay motivated and also become disruptive. These students generally become embarrassed and won't ask for help from a teacher*. For those students who do not like to ask for help, ICT empowers temporarily by allowing them to experiment with and develop a hit and miss approach to learning. To write, however, that: *Students were not afraid to make errors as they could easily be fixed*, and to interpret this phenomenon as an empowering experience is to make a dangerous association between risk taking in cyberspace and real life experimentation: *Computer programs can be highly interactive and provide many real world experiences for students to engage in; Text, music, images, movies and sound can all combine to create a multimedia experience reflective of real life; ICT use is a real world skill; I believe strongly in the personal growth perspective of teaching where students are provided with as many experiences true to real life as possible and simulations allow for this*.

Engaging with a program that makes corrections and alterations to classroom work easier can, however, paradoxically encourage a passive, reactive, hit-and-miss approach to learning: *It is much easier to fix errors; before they would be too lazy to fix their mistakes.* When errors are easily fixed, the need to avoid mistakes in the first place becomes less important. Students learn that instead of forward planning and design and an awareness of the consequences of lack of thoughtful preparation, the ease which a spreadsheet can be adjusted, charts reshaped and essays reformatted or items checked in or out means that identifying errors in processes can be left to the computer. Postman (1992) explains that once the data is transmitted, the individual can relinquish control:

It is apparently sufficient that the computer has pronounced. Who has put the data in, for what purpose, for whose convenience, based on what assumptions are questions left unasked. (p. 115)

Disempowerment occurs in other, more subtle ways. Stoll (1995) refers to the “stiff-walled logic of computers” (p. 46) and Bigum and Green (1992) describe ICT as a prescriptive technology and note how computer languages “‘read’ and ‘write’ information absolutely unambiguously” (p. 8). The student is presented with a non-compromising structure for learning. Answers are either right or wrong. Student resistance, arguments or questions are futile as there is no reciprocal dialogue with a software program.

Millar (2000) writes, “Consumerism provides a way to spread digital technology throughout society, thereby ensuring its future dominance and creating dependency” (p. 154). Integrating general literacy and communication skills with ICT skills through the use of word programs, email, spell-check and by connecting to scanners, Ipods and mobile phones encourages dependency on ICT rather than agency with ICT. One pre-service teacher acknowledges a tension but accedes to the more powerful discourse, writing: *Students who use a computer all the time don’t get the appropriate skills in spelling and grammar because the computer program does it all for them but if they are actually doing the work what’s the harm.* The pre-service teacher’s emphasis here is on the production of text and overlooks the importance of developing deeper understandings about literacy processes and the social context within which texts are given meanings and value.

5.3.7 Controlling innovation: Obsolescence and change

Change is a fundamental part of social realities and encourages the development of resourceful, creative, flexible and adaptable social beings. An excessive desire for novelty

and the urge to spend valuable resources on the latest hardware and software, however, means that, instead of applying technology thoughtfully to liberate people from menial and repetitive tasks, a fascination for technological change and innovation actually enslaves people by creating the desire for novelty and the need for increased rates of consumption. Millar (2000) writes of the compulsion to know “what’s wired and what’s tired” (p. 155) and pre-service teachers also recognise this phenomenon, writing: *Students are always excited by new technology; Glamour of computers; Laptops are a new innovation and not a household item therefore they have a degree of preciousness and appeal; There is also great potential for laptops to be used as a novelty or time filler.*

Any form of compulsive behaviour is not only disempowering, but can also result in disengagement when the technology cannot keep up with expectations: *I found student interest in the computers to diminish dramatically as soon as we began to have technological troubles; A boring screen is unappealing; After the initial novelty wore off these laptops were used with decreasing frequency within classes; It is counter productive to have students struggling with outmoded systems at the expense of their enthusiasm.* To “delight in the machines for novelty rather than for what they can do” (Gerver, 1986, p. 15) results in superficial engagement: *Students about 50 percent of the time could only stay focused on the computer for a few minutes and soon resorted to playing games,* and encourages a careless or negative attitude towards anything that does not represent the latest technology.

The discursive techniques that promote freedom, speed and constant innovation not only encourage subversive student activity, but also irresponsible behaviour towards the technology: *I saw that there needs to be very strict security; Things work best when tops are kept by the school and not sent home. This eliminates the problem of students forgetting to bring theirs or breaking them.* Arguing the importance of being up-to-date emphasises the need for change and creates contempt for anything deemed old-fashioned or obsolete. This discursive technique promotes innovation by encouraging increased rates of change. For education this position becomes highly problematic because innovation can be confused with novelty: “the idea of newness is closely linked with that of improvement” (Postman, 1992, p. 53).

ICT is constantly reinventing itself. To stay up-to-date is a demanding and time consuming exercise for both teachers and students: *Costs of professional development would be enormous ... also be ongoing because continued use of computers is necessary to retain understanding but also because of the rapidly changing nature of IT in general.* Teachers in particular are burdened with the need to make time for additional professional development to keep them on top of the latest ICT developments: *Teachers and students alike must continually be learning how to use their computers in order to learn a topic of focus.* Furthermore, to give advice on service providers, buying a computer, setting up software or even recommending useful websites is a short term proposition as these products and services are continually changing. By this means, teachers are constantly placed under pressure respond to the social impetus of innovative ICT practices through “an approach which starts from the availability of the equipment and then tries to find uses for it” (Gerver, 1986, p. 159).

5.3.8 Controlling creativity: Standardising processes

Closely linked to innovation and change is the concept of creativity. Ironically, pre-service teachers’ assessment of student creativity can be qualitatively diminished if it is based upon the capacity of software programs and students’ ability to cut and paste and incorporate a bricolage of images, fonts and colour combinations. It is important to remember that students’ online creativity is limited to the graphics programs purchased by the school:

We think that pointing and drawing programs open up new vistas to graphic artists. But they strongly limit the artist’s choices of colors, sizes, shapes, and textures. Moreover, the artist must strictly follow the program’s rules. (Stoll, 1995, p. 46)

In this way ICT use can encourage a focus away from the development of students’ capacity for tolerating, and constructing meanings out of, ambiguous concepts and processes. Postman (1992) points out that one of the aims of education is to “help the student function without certainty in a world of constant change and puzzling ambiguities” (p. 172). In contrast ICT’s binary logic constructs a non-compromising framework for interaction and production:

Computer systems are excellent vehicles for handling data which can be unambiguously categorized or quantified. It is more difficult for them to cope with feelings, motives, aesthetic qualities ... ambiguities, uncertainties, etc. Many tasks involve both kinds of data

... man tends to be drawn into the computer model's rational way of interpreting a task, and the less quantifiable aspects are not given appropriate emphasis. (Gerver, 1986, p. 161)

To miss a dot or forward slash is to be incomprehensible to the system and, therefore, to be denied access. Normative practices are maintained as a result of such unrelenting standardisation. To comply with the program's protocols is to have social access, information and power.

It is not surprising, therefore, that so many pre-service teachers' understandings of inclusion are informed by a desire to be identified with the privileged norm: *The use of ICT facilitated inclusion; Everyone's handwriting looks perfect on an electronic word processor*. Inclusion is used here in the context of standardised literacy practices. "Standardization promises to eliminate ambiguity" (Postman, 1992, p. 64) and this is demonstrated to some degree in education systems which seek to determine student outcomes irrespective of the needs and priorities of individuals and their local communities:

[The] concern of technologists has been standardization ... schools ... are supposed to ensure that seventh graders, say, will emerge at essentially the same age with essentially the same sets of skills and broad values. (Hodas, 2006, p. 206)

The technological model of education, envisages a future populated with production line cyborgs: information workers capable of sitting for hours in front of computer screens, consuming, communicating and operating with and within an electronically mediated reality.

Subjectivities are produced at embodied sites and the term corporeality emphasises the role embodiment plays in the production of unique experiences and perspectives of the world. Corporealities are not standard or homogeneous, and the potential for creativity and social change exists because of these uniquely embodied perspectives, experiences and interpretations of the world. To limit the creative potential of corporealities through increased standardisation is, therefore, to underestimate the importance of diversity and discourage critique of and resistance to the current social order.

Many pre-service teachers believe ICT use represents authentic learning because ICT allows a multimodal representation of an event beyond the classroom: *Students are using*

ICT to explore real situations. The immediacy of visual representation in particular makes invisible the medium within which the image, as text, is framed. Furthermore, whereas handwriting signifies the unique potential of the embodied individual through its inevitable departure from the norm, standardisation, through ICT use and the use of approved fonts, erases the embodied sites of textual production. Consequently, ICT literacies represent privileged forms of textual production as texts produced by a computer represents a technique that bypasses the variables of embodiment, a technique that appeals to “the authenticity of experience” (Snyder, 2001b, p. 53) because it corresponds to and supports our expectation of what texts should look like in a technologised and regulated world:

In the epistemological sense, immediacy is transparency: the absence of mediation. It is the notion that the medium can erase itself and leave the view in the presence of the objects represented ... [the] experience is therefore ‘authentic’. (Snyder, 2001b, p. 53)

Standardisation promotes the use of technologies that regulate and control the body’s potential to create, adapt and change the world. Ironically, used within such a highly regulated framework for education, the terms individualisation and creativity are not about the unique capacities of embodied individuals for resolving pressing social and environmental issues, but represent instead, a reductionist understanding of students as isolated and interchangeable units. Creativity means the subject is capable of working on different parts of the same machine or on different machines, ensuring an endless cycle of consumption and production of information:

Attend any conference on telecommunications or computer technology, and you will be attending a celebration of innovative machinery that generates, stores, and distributes more information, more conveniently, at greater speeds than ever before. To the question “What problem does the information solve?” the answer is usually “How to generate, store, and distribute more information, more conveniently, at greater speeds than ever before”. (Postman, 1992, p. 61)

To argue that ICT is relevant because it allows: *Students to explore the world as a smaller global environment*, and: *Such assignments as those containing graphs, charts, drawing logos 3D models etc can be spiced up a lot and look more professional and real world focused than hand presented*, is to value the simulation over the original because of its potential for endless manipulation and reproduction. Baudrillard (1994) refers to this

phenomenon as the hyperreal, whereby the real, being compared to a simulation of itself, is found to be lacking.

5.3.9 Constructing new spaces

While embodiment represents the site upon which understandings of the world are constructed, ICT discourses construct the experiences of corporeal perspectives as peripheral to an understanding of action in cyberspace, thereby making possible the rhetoric of freedom and speed, in spite of the physical restraint required of bodies sitting at a computer terminals. The physical needs of healthy growing bodies have been marginalised by the desire to adapt bodies to technologies that promote endlessly new spaces and vistas:

A further concern is whether children of the future will ever need or want to move from the wide, sanitized world opened at a touch of the keyboard to a more visceral experience within the confined limits of a real back garden, street or park. (Greenfield, 2003, p. 175)

Space is a concept that is realised through embodiment and yet one pre-service teacher questions the point of: *Susan's multi-coloured clay cross-section model of Earth*, arguing that: *Although the model would surely have been informative, it would have been static and only interest the students for a short time*. This position undermines the importance of moving students' bodies around objects for developing their understandings of corporeal locatedness and perspective. Working with a physical model enables students to experience the resistance of materials in their hands and understand perspective as it is constructed through a number of corporeal positions. To promote the use of: *Digital diagrams to reduce space issues in the classroom* is, therefore, to limit understandings of space as it relates to bodies and to privilege, instead, a very difference experience of space because everything comes to, or revolves around, the student. Admittedly student work in electronic spaces would certainly help to minimise the potentially disruptive effects of students' moving around the classroom and make classroom management easier.

For the corporeal subject, perspective depends on the position and location of the body and speed depends on the physical capacity of the body for movement. In cyberspace, however, perspective depends on the computer program that produces it so the physical body becomes peripheral to understandings of the world. The following advertisement for

Virtual Communities (2005) provides an example of technological perspectives of learning being privileged over embodied perspectives of learning:

Is your old computer too slow and making it difficult for your children to do their homework? Imagine having a super fast PC that helps your children get their work done in half the time. (p. 8)

The question of how fast children can think is not addressed because the line of reasoning represented in the advertisement places technology before pedagogy. The need for speed supersedes the need to understand children's stages of development or the needs of individual learners.

Without corporealities, increased speed can be realised and experienced through the constantly changing perspectives of the computer screen and the spectacular visual effects of computer graphics. To write, therefore, that students are: *Motivated to learn by using laptops which are a bank of knowledge*, or: *Computers engage the students through engagement, which is a form of intrinsic motivation*, is to raise some important questions about teachers' understanding of student motivation and engagement:

Claims of increased student engagement and productivity appear to require no clarification or evidence. It appears completely adequate but ... Efficiency and interest is a technical answer, an answer about means, not ends; and it offers no pathway to a consideration of educational philosophy. Indeed, it blocks the way to such a consideration by beginning with the question of how we should proceed rather than with the question of why. (Postman, 1992, p. 171)

5.3.10 Controlling efficiency

The concept of efficiency in education is highly problematic as administrative agendas do not always serve the interests of student learning. The Internet does represent a wealth of resources for students and teachers, but students need to be purposeful and disciplined in their search and must be critical of the information they access: *My colleague teacher restricted the students to two websites possibly to prevent them from going off track; There are too many distractions on a computer; Internet is a distraction rather than a motivator*. Research is time consuming, it is very easy to get side-tracked, and information overload means a lot of time is required to sort through the information that is relevant to the research question: *Not all the websites are suitable for students; Teachers should spend lots of time on choosing them; It takes time to analyse web resources; Should consider the ability of the students to sieve the relevant information from the overloading*

amount of information available on the World Wide Web. While students need to learn these skills they can also be easily distracted or overwhelmed by the number of resources available, again taking the focus away from the key learning area and compounding the difficulties students face with limited time in the classroom and limited computer access.

Further undermining the case for increased student productivity through ICT use are pre-service teachers' experiences of lost time due to technical difficulties: *They are not always guaranteed to work properly and can sometimes just make the task more difficult and time consuming; It's a worry when things go wrong, when a computer crashes and you lose everything; I agree the computers can constantly cause technical issues; Technical problems can cause major problems ... speed of Internet connections ... the whole network crashed ... I have experienced this personally and it was very disruptive. Students couldn't access resources, teachers couldn't access planning, newsletters couldn't be printed; Wireless connections can be temperamental.*

In the ICT case study (Garthwait & Weller, 2005), Susan acknowledges that optimal access to the server occurs at certain times of the day, that ink runs out, and students lose work when the server goes down. Not only Susan but also many pre-service teachers point out that ICT time does not always make teaching and learning easier: *I noticed that lessons involving computers took up more preparation time.* While technical issues were out of Susan's control, her willingness to question the reliability of the technology nevertheless leads many pre-service teachers to question her competence. Rick is notably silent on the matter.

Echoing Susan's and pre-service teachers' concerns regarding the reliability of the technology, the researcher's field journal (Budd, 2008) records the occurrence of technical difficulties during every lesson recorded. Problems include: *No sound; The line keeps dropping out; The video camera doesn't work; Long delays in transmission; No access to the server.* Gerver (1986) voices the same concern over the issue of reliability:

Computers, as they have been presented through advertising and in other public representation, are often surrounded by an aura of reliability, if not infallibility ... can eliminate the kinds of human errors which arise from tiredness, distraction, emotional involvement, impatience, and so on.... The rate at which computer systems tend to break down stands in striking contrast to this emphasis on absolute reliability. (p. 11)

This excerpt was written 20 years ago and in spite of numerous advances in the ICT industry, the same concerns about reliability are voiced by pre-service teachers today. Efficiency, therefore, “is not the straightforward, value-free quantity that those who most embrace it suppose it to be” (Hodas, 2006, p. 205).

The problematic nature of pre-service teachers’ understandings and experiences of student engagement and motivation through ICT use is compounded with the strange conflation of increased productivity with higher order thinking skills: *Having such volume of information quickly available helps students become more independent and free thinking.* The application of ICT in a learning sequence, however, does not guarantee the emergence of a progressive learning environment. One pre-service teacher writes that ICT is: *An exciting addition to the teaching environment because it encourages students to make global connections and to think more broadly about world issues or issues affecting them at home.* Others complain that: *Students’ rights on computers are almost becoming out of control as they constantly use instant messaging and look up irrelevant and unsuitable websites.* Many pre-service teachers accept and promote ICT discourses while concurrently reflecting on the discrepancies between the promise ICT holds for improving student learning outcomes and their experiences of students’ ICT use in the classroom. These discursive tensions are evident in the following pre-service teachers’ comments: *ICT is used for final copies and quick research problem; Students see research as easier because they don’t have to go to the library; Students don’t even read their own work, they just pick out key words and cut and paste.*

Many pre-service teachers claim that students are more creative when using ICT: *Students are informed and act more creative than using traditional paper and pencil.* A creative student is a productive student, but Gerver (1986) points out that creativity can be undermined as “the seductive ease of using word processing can result in verbosity” (p. 27). Productivity can at times simply represent excess, and repetitiveness can be harder to avoid when cut and paste techniques can be applied with speed and ease. The possibility remains, therefore, that students can produce texts with very little understanding or critical reflection. Stoll (1995) further problematises the capacity of ICT for augmenting student creativity, writing: “computers punish the imaginative and inventive by constraining them to prescribed channels of thought and action ... we program computers, but the computers also program us” (p. 46).

5.3.11 Controlling classrooms

The issue of control in relation to ICT use is most explicitly discussed by pre-service teachers in terms of classroom management. The positive and negative effects of ICT use in the classroom create an interesting tension: *Boredom is one of the main reasons for behaviour problems so laptops should reduce such issues.* Technical difficulties, however, can be frustrating and old equipment and software can be boring for students, thereby exacerbating behaviour management issues.

The subversive potential of ICT can be empowering for students. The role models provided by the cyberpunk genre of science fiction are often computer hackers admired for their technological prowess and their ability to beat the system. The researcher's observational journal (Budd, 2008) also confirms the subversive potential of ICT for those students whose ICT knowledge, due to their willingness to experiment with the system, is often far greater than that of their teachers. In addition, pre-service teachers complain about the difficulties of controlling students' subversive activities writing: *In my school experience I found that monitoring students was extremely difficult on computers; Behaviour management issues of students playing games, using email, accessing inappropriate sites or even mishandling each others' computers became problem; Students play games and get off task; Monitoring students to ensure they are on the correct sites a problem; Keeping the students on task a problem; Some students view ICT use as a right not a privilege; Only one printer in room so students had to wait ... lost time, distractions; Ten computers for 22 students a management nightmare; Abuse of ICT; Hard to monitor what exactly student is viewing; Behaviour management issues is simply part of the job; Students clever at minimizing windows like game sites; Subversive activities easily indulged by students; Students swap from work to games/emails while appearing to work; At the end of class I asked all students to print out their work and was suddenly faced with out-of-seat behaviour like I had never witnessed. Many students were aimlessly wandering around waiting for their work to print. Some had not put names on essays and decided to print again rather than merely writing their name on it. The printer jammed, students had trouble logging off; Some disks would not save work and some students crowded around me to hand in work or make some lame excuse that they needed to finish it at home.*

The argument for increased teacher control of the classroom through ICT use is, nevertheless a powerful one, which is demonstrated in the comment: *Laptops would greatly increase students' motivation in and dedication to their work.* To maintain control over classroom behaviour, however, pre-service teachers discuss additional strategies using ICT. This first strategy is to threaten to withdraw ICT access: *Mistreating the laptops could result in written work.* Another strategy is to use ICT as a reward or compromise: *First finish your work then you can play a game.*

Pre-service teachers also describe gendered ways of using ICT that draws student approval or models superior ICT competencies: *Rick found ICT made classrooms an easier place to manage; [Susan] is an avid planner who did not have the ability to accept a change of direction by the students.* Students respect positions of power. Teachers who can demonstrate a high level of technical competency gain the confidence and respect of their students, although this can backfire for a female teacher who may be considered too masculine. Female teachers may have more cooperation if they empower male students to demonstrate their competence instead, reinforcing at the same time the gendered expectations of ICT use to students. In spite of the large number of pre-service teachers' complaints regarding student behaviour when using ICT, many still feel justified in simply asserting that: *[ICT is an] invaluable behaviour management tool; A success of the [ICT case study] programme is the apparent absence of any significant behaviour management issues.*

5.3.12 Controlling corporealities

Not only are corporealities diminished by the hyperreal, but certain aspects of experience that do not cohere with the ICT discourse become invisible. To write, for example, that: *A computer can be a great way to save on paper usage, which in turn can be more environmentally friendly – which would be great for modeling the values of the essential learning,* and: *It is my opinion as student become more familiar with computer usage this need for printed material will be less dramatic,* is to deny the experience of the majority of pre-service teachers who are concerned about waste: *Computers also raise issues of consumption and the environment when I was on school experience, I saw a vast amount of accidental printing, paper and ink supplies causing waste.* Over 20 years ago Gerver (1986) declared that “the electronic office, far from being paperless, is awash with more paper than ever before” (p. 27) and same can be said today.

Constant ICT use makes a world without ICT less visible and, therefore, less relevant. In this way new technologies and their accompanying discourses change what is meant by knowing and truth; they alter those “deeply embedded habits of thought which give to a culture its sense of what the world is like” (Postman, 1992, p. 12). Disengaging or dislocating embodiment as the site for meaning making, and engaging instead with computer mediated experiences of the world enables the cyborg metaphor to inform understandings of human potential in educational discourses.

The cyborg represents the interdependent relationship between humans and their technologies. The discourse of progressive bodies encourages increased time spent with, and attached to, ICT by promoting greater computer use across all subject areas. Little attention is paid to the effects of excessive time spent in front of a computer screen on student’s physical development and mental wellbeing. Some pre-service teachers, however, voice their concerns about computer time: *We ould also hope that using computers in a one-to-one situation at school may encourage students to spend less time on computers at home as they get their fix at school.* Many students already spend too many sedentary hours each week in front of a television screen or at their playstations. Schools need to consider how many hours of computer time for classroom work and homework are appropriate for their students, but this is rarely, if ever, the focus of teachers’ professional development sessions for ICT competency.

Environmental issues also place understandings of efficiency and productivity into a broader social context. The waste and increased rates of obsolesence associated with the computer industry creates environmental problems (Millar, 2000). Furthermore, ethical issues linked to computer industries, such as the exploitation of women and children in silicon sweatshops in Asian countries, represent the far reaching effects of the ICT industry. Corporate downsizing in western countries is enabled through ICT networks that facilitate the outsourcing of jobs to countries that can provide a cheaper and more compliant workforce. Hodas (2006) points out that “schools can never be independent of the values of society at large” (p. 217), so that while many pre-service teachers point out that ICT is just an educational tool, its use and social effects are informed by broader discourses that are anything but neutral. Millar (2000) argues that “productivity must be measured in terms of a society’s total input and output. This means the negative

consequences of technology-induced unemployment as well as the social and environmental costs must be considered” (p. 155).

5.4 The discourse of posthuman pedagogy: Constructing teacher efficacy

By assigning agency to computers (Postman, 1992) and making little distinction between the quality of human-human interaction and human-computer interaction, the discourse of posthuman pedagogy signifies a blurring of the distinction between knowledge and information (Greenfield, 2003). Siegler, (as cited by Heffron, 1995) a cognitive psychologist, explains this phenomenon:

As researchers in the growing field of knowledge acquisition and engineering are quick to point out, in joint human-machine cognitive systems “the locus of control resides with the machine portion of the ensemble.” Because the goal of interaction is to develop the human expert reflected in the machine. (p. 510)

The discourse of posthuman pedagogy is informed by the discourse of progressive bodies as it makes use of the cyborg metaphor to argue how ICT can facilitate student potential by developing students’ higher order thinking skills and increasing student creativity, productivity and engagement, thereby also reducing behaviour management issues. The discourse of posthuman pedagogy constructs the progressive and competent teacher as one who promotes close relationships with technological entities as this is a relationship through which the deficient body can be improved by the more efficient technology.

Technology is not a neutral element in the practice of education. Teachers do not merely use technologies but are also used by them (Postman, 1992) as they feel restricted and dominated by the requirement to use all available technology: *Perhaps this means that the way of the future is an all or nothing approach and that integration of new technology into old practices is doomed to fail; It would be compulsory in the future that every school, every classroom and every student uses computers to improve their learning.* Technology creates its own imperatives and, at the same time, creates a wide-ranging social system to reinforce its imperatives: *Implementing PC programs in classrooms is a must in this new century.* A posthuman pedagogy, therefore, changes teachers’ classroom practices by redefining what teachers are, redirecting where they focus their attention, and re-informing how they can best develop a student’s potential as a consumer of information.

The discourse of posthuman pedagogy provides a new teleological framework for education that foregrounds the potential of cybernetic entities for making total connectivity a reality (Rifkin, 2000), and the role of education within this teleological framing of culture, is to connect students to the ICT network: *Teachers should fully understand [ICT's] capabilities to help a diverse range of students reach their full learning potential.* Kelly, (as cited in Rifkin, 2000) editor of *Wired* magazine, writes: “the act of the coming era is to connect everything to everything” (p. 19). Total connectivity facilitates the individual’s capacity for consuming, producing and facilitating the flow of ever increasing amounts of information.

Although most pre-service teachers argue that ICTs are neutral tools that help teachers and students with their classroom activities, to align oneself with ICT discourses is to support the worldview that such discourses afford. Pre-service teachers’ pedagogies and assessment of their classroom practices are accordingly affected by this worldview as ICT metaphors and terminology are unproblematically incorporated into their professional discourses: *Students brains retain and reflect information differently than previous generation; Students brains are wired differently; Computers are becoming a requirement to survive; As generations progress more students will be suited to this learning style; Method of teaching has adapted to this new environment; More than ever, humans depend on technology... this dependence will increase exponentially over students’ lifespan; The key is integration of the new, the old, the digital, the physical.*

5.4.1 Locating agency

Pre-service teachers’ use of terms such as productivity and efficiency frequently ascribe agency to the technology itself rather than to teachers or students who are, instead, constructed as conductors rather than producers of information, as non-resisting points through which information passes. Ascribing agency to technology is symptomatic of the posthuman condition in which the body is seen as deficient and, therefore, an unreliable element in the construction and communication of knowledge. As a result, ICT discourses disempower and marginalise those teachers who envisage a future inconsistent with the posthuman discursive construction of human potential: a future in which a sustainable and equitable society is more important than the constant turnover of new technologies.

ICT discourses foreground the need for greater efficiency and productivity in education and this is facilitated by the use of ICT to integrate the curriculum and play a central role in students' learning experiences: *[ICT] have fast become not just a supplement to my pedagogical discourse but as an integral component*. Games, emails, simulation programs and web searches, are understood to be more authentic, that is, ICT better represents the world outside the classroom than old fashioned classroom games, face to face interactions and role plays: *ICT use makes learning authentic*. Authenticity is a problematic term in the context of this thesis, which problematises truth claims and argues that access to any reality is only possible through discourse. If pre-service teachers construct classroom experience as more authentic in cyberspace, then agency is shifted away from teachers' and students' corporealities to the hyperrealities of electronic networks and posthuman discourses: *Multimedia experience as reflective of real life*. Teacher efficacy is increased through compliance with a discourse that privileges the authenticity of experiences in cyberspace. Furthermore, the authenticity of teachers' classroom practices can be endlessly replicated and validated in cyberspace with the click of a copy or replay key.

Educational discourses that focus on developing students' skills and potentials around, and through, ICT use, signify a posthuman pedagogy. Hodas (2006) points out that the revolutionary potential of technological innovation is emphasised in ICT discourses, which promise to provide students with entirely new sets of skills and expectations. At the same time, however, teachers are paradoxically reassured that "their roles, positions, and relationships will remain by and large, as they were before" (p. 209). This contradiction creates an uncomfortable tension as pre-service teachers struggle to link the behaviourist techniques utilised in classroom ICT practices with gendered understandings of teacher ICT competency and constructivist models of good teaching practice.

5.4.2 Constructing gender: How ICT informs pedagogy

Gendered interpretations of pedagogy based on ICT use produces a number of contradictions and tensions in pre-service teachers' understandings of teaching and learning theories. Rick's positive attitude and affirmation of the benefits of ICT use, for example, automatically draws positive assumptions about Rick's pedagogy: *Rick saw the use of computers as being the medium through which the new content was first learnt, rather than an extra, revision time ... he demonstrates more constructivist teaching values because he encourages students to actively engage in creating meaning and to make their*

own links between knowledge by problem solving and group work ... and he allowed for more higher level learning to take place through using computers more as a tool for learning other content than just for practicing it; [Rick's students] engage in discovery learning ... discover the answers for themselves ... collected and interacted with their own data; Rick embraced the advance in the use of computers; A flexible and progressive approach; More constructivist and student centred; Rick took advantage of the laptops potential as aids for students who may be kinesthetic learners where learning occurs more readily through the act of doing. Pre-service teachers tended to interpret Rick's pedagogy in terms of contemporary understandings of good teaching practice, referring to terms such as: *Non-interventionalist; Constructivist; Student centred; Flexible; Discovery approach; Scaffolding; Inclusive; Cooperative group-work; Deep understanding, and; Authentic learning tasks.* Some pre-service teachers argue that Rick is informed by: *Piaget and Vygotsky*, or that he is: *Humanist like Bill Rogers*. While it is important for pre-service teachers to acknowledge the positive outcomes of ICT use in educational contexts, it is also important for them to be able to examine who benefits most from these outcomes and to ensure that inclusive practice with ICT does not mean the exclusion of knowledges that challenge hegemonic discourses.

Susan's more critical approach to ICT use caused the majority of pre-service teachers to interpret her classroom practice through less positive educational terminology such as: *Chalk & talk; Interventionalist; Teacher centred; Traditional; Product driven; Not so inclusive, and; Behaviourist.* Pre-service teachers write: *Susan comes from a behaviourist perspective; Susan demonstrates behaviourist teaching values of valuing observable links between computers and work improvements, using computer time as a reward; In Susan's case computers are seen as extrinsic motivation; A teacher centred approach; Didn't allow for discover learning; If Susan let students discover websites on their own they could have ownership of their work; Susan appears to be an interventionalist; Should be more structured in her instructions; Susan's lesson structure didn't suit the integration of ICT into the classroom; Susan should be more pre-emptive of outcomes; Did not have the ability to accept a change of direction from students; Knowledge of content is vital as a starting point for effective teaching; Susan's frustration is due to less confidence in operating the technology and her levels of experience; She used a product driven perspective rather than a process driven perspective.*

Although some teachers thought Susan was a good teacher, the overwhelming majority thought Rick was the more effective, theoretically informed teacher: *Susan has clearly not embraced the opportunity as effectively as Rick; While she employs a range of strategies, it does not appear to be supported or built upon a sound theoretical basis.* Susan's awareness of privileged learning outcomes and her attempt to scaffold and work to students' zone of proximal development was recognised by a few pre-service teachers: *She knows what the students need to know and scaffolds their learning.* In general, however, pre-service teachers interpreted this as interventionist, and her long introductions indicated a teacher centred approach. Conversely, Rick was considered to be: *A non-interventionist teacher who lets students take responsibility for their own learning.*

Susan had difficulty finding relevant, student-friendly sites and had to point out sites with the appropriate levels of information to the students. One pre-service teacher acknowledged that Susan: *used a critical eye when selecting resources* and Gerver (1986) acknowledges the importance of identifying appropriate resources, writing:

There is potential danger in confronting learners with the responsibility for exercising more autonomy than experience or training have prepared them to exercise. (p. 161)

Another pre-service teacher, however, overlooks Susans' efforts in scaffolding information for her students, writing: *Susan found IT engaged students by being friendlier, up-to-date, offering different levels of information.* The pre-service teacher ascribes success and agency to the technology instead of the teacher.

The most notable tension in pre-service teachers' assessment of Rick and Susan's classroom practices, as informed by their ICT use in the classroom, occurs when pre-service teachers' use behaviourist principles to explain the effectiveness of ICT for teaching and learning: *ICT uses Pavlov's classical behavioural condition, stimulus and result; ICT for drill and practice; laptops provide instant feedback; A behaviourist approach; Computers readily lend themselves to this [behaviourist] approach; An example of classical conditioning elements involved in ICT is the use of immediate response software; Students are rewarded with animations; ICT used primarily in a behaviourist approach, seen as reward; Music used as background noise as behaviourist approach; Form of operant conditioning; Due to students/children today being constantly*

exposed to technology in the form of computers, TV digital games and advertising etc they are more conditioned to learn in this way; [ICT is] a rewarding stimulus; ICTs serve to provide immediate reinforcement and feedback; Rewards in the form of game points and wins, competition and fun; Students are becoming lazy in their writing skills... this is an effect of ICT conditioning. The incongruity of pre-service teacher's preferences for Rick's constructivist pedagogy being based on behaviourist principles demonstrates the powerful influence ICT discourses and hegemonic discourses have on the construction of teacher identity and understandings of teacher efficacy.

Gendered discourses work in complicated and contradictory ways. When the political effects of gender are not acknowledged as being a key problematic, then pedagogic intervention can focus on the need to change women's attitudes to technology rather than men's practices with technology, thereby reproducing and reaffirming a deficit model of female technological competency: *[Susan] has not unleashed the potential of laptops.* A gender deficit approach would recommend a "pluralist reorganization of pedagogy and curriculum for girls and women in accordance with women's ways" (Bryson & de Castell, 2007, para. 13). The problem with this approach is that it "leaves the gender of technology intact and operates in different ways on the regenderment of women" (Bryson & de Castell, 2007, para. 13).

5.4.3 Teacher efficacy: Making ICT look good

Teacher efficacy, in accordance with a posthuman pedagogy is powerfully influenced by the need for ensuring students' access to and competency with, ICT. Education plays its part by providing ICT facilities, and teachers are expected to facilitate and promote student ICT use in order to be seen to be accommodating the push for a more inclusive and productive education system. One pre-service teacher argues that: *If parents are paying for lap-top programs via school fees, then there will be an expectation that lap-tops are used consistently in the school.* Not to do so is to lose credibility as a professional educator who is up-to-date and who is able to provide students with important skills for the future. To utilise new technologies is, therefore, to prepare students for the future and to demonstrate effective classroom practice.

If technical difficulties are experienced, however, blaming the technology is interpreted as a feeble excuse for technological incompetence: *Technical problems could have been*

turned into learning opportunities. One pre-service teacher writes: *I observed students undertake research activities on the Internet. Engagement was extremely minimal but I believe this is due to the learning task.* This suggests that teachers' can undermine students' natural engagement with and affinity for technology: *Students go home and the first thing they do is play on computers, they can relate to this medium and it's more focused on the way they think and learn it's second nature to them; Teachers must exploit students love for computers; [Students] feel more comfortable learning with the aid of a computer than the old methods of yesteryear.* These arguments leave no room for suggesting that ICT can cause classroom management issues and draw students' attention away from the key learning area.

Pre-service teachers note how ICT can benefit teachers and students in various ways: *As a tool for planning and implementing interesting lessons; I feel laptops or ICT in schools offer a creative platform where students can develop their own problem solving, reflective thinking and interpersonal skill; In any occupation we try to find the most efficient, inexpensive and less demanding way to accomplish a goal or task.* Unfortunately, as a result of these expectations, pre-service teachers are finding themselves shouldering an increasing burden: *The effectiveness of ICT use depends upon teachers' preparation and awareness of the potential of such devices in the classroom; The onus is on the teacher to develop their knowledge in order to be able to use computers in a way that will promote deep understanding.* Teachers are expected to make technology look good, and in the process, make themselves look good because they have demonstrated their technical abilities.

If students or teachers experience technical difficulties, the responsibility for decreased classroom productivity never lies with software, the hardware, programmers, technicians or educational administrators who mandate desirable ICT outcomes. Instead, teachers' classroom practices are placed under closer scrutiny. Susan, for example, is accused of wasting: *Much of her valuable time on lengthy introductions,* while students' work time lost due to ICT downtime or Susan's personal time lost due to the need to check websites and links remains unexamined.

Closer scrutiny of teaching practice has been justified amid government claims of a growing literacy crisis (Winch, 2007). The demand for greater teacher accountability over

student outcomes has been directly linked to the demand for an ICT literate society: *ICT changes the nature of planning; ICT availability affects the teacher's ability to plan ahead; Teachers need to be educated in ICT so they can provide challenges for students; Teacher planning is important to access functioning server; Teaching styles need to change to embrace these technologies; If student doesn't learn by listening or reading, teacher must find novel ways to let students experience learning; Effectiveness of ICT weighs upon each teacher's preparation and awareness of the potential of such devices in the classroom.* Teachers are held accountable for students' ICT skills and are expected to have back up work just in case the technology is not operational. This requires a pedagogy that can take into account not only the complex dynamics of student moods and personalities but also the uncertainty of technological availability. This high level of accountability is in contrast to student or administrative attitudes to ICT, where accountability can be absolved with the words, the computer is down: *There is a chance of excuses being made for lack of work being produced for example work not being saved & computers shutdown.* Postman (1992) explains that:

Because of its seeming intelligence and impartiality, a computer has an almost magical tendency to direct attention away from the people in charge of bureaucratic functions and toward itself, as if the computer were the true source of authority. (p. 115)

The discourse of posthuman pedagogy utilises a discursive technique that ensures that teachers do not stray too far from the safety net of authorised, hegemonic discourses. Pre-service teachers' complicity with ICT discourses depends upon the invisibility of these enactments of power relations. Teachers derive pleasure and power through their compliance with a dominant discourse that orders, authorises and rationalises ICT practices in education: *as a part of my teaching practice, computers have fast become not just a supplement to my pedagogical discourse but an integral component.* Foucault (1980) writes:

What makes power hold good, what makes it accepted, is simply the fact that it doesn't only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network, which runs through the whole social body, much more than as a negative instance whose function is repression. (p. 119)

Pre-service teacher pedagogies are aligned with powerful ICT discourses that emphasise the "economic potential and educational necessity of the integration of IT within institutionalized education" (Kenway & Nixon, 1999, p. 465). Consequently, pedagogic

arguments focus on developing the information processing potential of ICT users for future technologies, rather than understanding and developing the potential of embodied subjects for constructing their own futures.

5.5 The discourse of interactivity: Constructing community

The discourse of interactivity represents a discursive technique used by pre-service teachers that makes little or no distinction between the quality of human and machine interaction. The concept of interactive software, however, becomes problematic when transferred directly from ICT discourses to explain and promote constructivist pedagogies. To interact with a non-resisting, compliant other that can be switched on, off, or over at will, is to construct a world that mirrors the immediate interests of the self. When contesting corporealities are erased from view then values and ethics become a moot point. This type of interaction undermines the notion of community and the importance of reciprocal relations and works to increase the individual's focus on the self at the expense of developing cooperative relations between embodied subjects (Bell, 2000, p. 629).

5.5.1 Authentic spaces: Constructing the hyperreal

The discourse of interactivity makes invisible the qualitative difference between human interactivity and machine interactivity and supports pre-service teachers' understandings of ICT as a tool that promotes and assists constructivist, authentic, student centred pedagogies. In so doing, the discourse of interactivity supports the discourse of progressive bodies and the discourse of posthuman pedagogy by making the body a redundant medium for constructing understandings of, and relationships with, the world.

A discursive technique that supports the phenomenon of the hyperreal, and enables cyberspace to be constructed as more real than the space bodies inhabit, is only possible when the body is relegated to the margins of a discourse. Cartesian philosophy, which privileges mind over matter, constructs a mind/body dichotomy and refers to the mind as if it were an entity quite separate from the medium that enables the construction and communication of a world beyond itself. The discourse of interactivity maintains the powerful dichotomies that promote a hegemonic worldview by separating the mind from the body, male from female, reason from emotion, culture from nature, technology from biology and the self from the other. The mutually constitutive relationship between the

self and the other is undermined by reductive, binary processes, which construct the formation of the individual subject through isolated, autonomous processes. The subject's sense of control is enhanced in cyberspace as the disembodied subject can be seamlessly integrated with, and authorised by, the normative technologies that construct social values. Inclusive pedagogies do not promote a position that constructs the individual as the only authentic space or framework for interaction and yet this is implicit in the following statement: *Rick's students are self-directed, discoverers of their own learning, collecting and interacting with their own data.* Limiting interaction to the self and the same establishes a self-affirming reality that can leave everyone else on the outside: *Students with low self esteem could find virtual reality much more inviting than having to construct meaningful relationships; Student with special needs ... does not enjoy interacting with the other students and thus this is a good way for her to practice her interactive skills.* In some cases, "working with computers takes precedence over, and is often preferred to, relationships with people" (Gerver, 1986, p. 24) due to an increased sense of control over the interaction. Computers can be less complicated than people to deal with. They can be turned on and off at anytime and offer a highly structured and, therefore, predictable environment within which to operate.

Interaction with the self, instead of others, is facilitated through online networks, which enable like-minded individuals to seek out and find each other. The result is a self-affirming, self-containing feedback loop (Hayles, 1999a) that heightens the subject's sense of autonomy. Hyperlinks also ensure that websites that concur with or promote a particular worldview are linked together: an information trail that constantly leads back to itself (Burbules, 2001). Perhaps this is why one pre-service teacher writes, *Laptops provide a friendlier environment for students to learn,* and another writes: *The use of computers promotes an inclusive environment.* These claims, unfortunately, are not elaborated on and go against the general consensus of pre-service teachers, who consider cyberspace to be a dangerously corrupt public domain requiring constant surveillance and control by teachers: *Viruses are a big concern; Plagiarism needs to be addressed; Every Tom, Dick and Harry putting their information and ideas on the Internet; A lot of information that isn't right and is sloppy.* Furthermore, online communities depend more heavily on texts than bodies to establish community memberships. Members are identified by their online literacy practices and these literacy practices establish protocols that not

only enable interaction but also exclude certain groups. Examples of exclusive practices range from insider jargon to sexual innuendo and flaming (Spender, 1995).

Pre-service teachers are very much aware of the need to develop inclusive pedagogies and facilitate students' abilities to access, relate to and understand a broader community beyond the classroom: *Authentic learning is interactive; Students are developing human beings and need real and meaningful social interaction; Susan overlooks that students are receiving authentic & rich tasks that are relevant and have real life context when using or learning how to use the technology; Computers is just a good way to incorporate the outer world into the classroom.* The school handbook (Department of Education, Tasmania, 2005) also points out that ICT can facilitate these needs by enabling access in a number of ways, for example: *Help available at any time; Isolated, rural or small schools, maintains learning pathways; Sick, disabled, home educators, isolated students, pregnancy, travellers, and itinerant workers.* These are valid points and ICT can certainly facilitate access to social resources.

A tension occurs, however, when access to and interaction with the technology supersedes the need for access to, and interaction with, other people, as this contradicts the principles of the social constructivist pedagogy endorsed by the pre-service teachers. If pre-service teachers do not explicitly question to what extent they want machines to model real world relationships for their students, then the assumption can be made that if a computer can do what a human can do, then the computer will do it better and students would, therefore, do well to emulate the performance modelled by the machine: *When using computers you can seriously cut down on physical objects; Text, music, images, movies and sound can all combine to create a multimedia; Computers can assist in demonstrating how to process information regarding the social structure and lifestyles of contemporary society.*

The claim that computers can replace real world or embodied experiences is supported by a discursive technique that constructs the computer as an authentic and interactive partner: *Computers are socially interactive; The computer acts as an intellectual partner; The computer's interactive nature; Interaction between the computer and user, in which it is acting as a tutor and giving feedback; Laptops have become a great partner in problem-solving; Students to master certain concepts through ... having the computer as a partner or peer; ICT permits interactive engagement; ICT allows us to work in teams*

collaboratively; Learning in his class comes from collecting and interacting with data. These comments are consistent with Boudourides' (1998) description of cybernetic constructivism which draws from the field of informatics and cybernetics to argue that human knowledge is constructed as a result of a "self-referential process of maintaining identity" (p. 3), explaining that the boundary, and therefore the identity of an individual is maintained by "preferential neighborhood relations" (p. 3).

Boudourides' (1998) description of cybernetic constructivism privileges individual perspective over collective perspectives and undermines the formation of a critically literate and self-regulating individual by avoiding difference instead of engaging with it. The same point is made by Sardar (2000) who argues that "a cyberspace community is self-selecting, exactly what a real community is not" (p. 744). The aim of interaction within this paradigm is to minimise resistance in the flow of information. Cybernetic constructivism aims to maintain the status quo as the individual seeks to continue the system that produces the individual's identity, even when that same individual is marginalised by the system that constructs it, so any identity is better than no identity at all. This is a reactive, and therefore, disempowering understanding of constructivism.

When Doecke (2007) writes of the need to connect, he means resisting "being trapped in a we-horizon, in which we speak only to people who look just like us" (p. 38). Some pre-service teachers, nevertheless, maintain and support a cybernetic constructivist position by accepting that simulated experiences are the same as embodied experiences: *Computer methods account for auditory and visual styles; Teachers could direct the kinaesthetic learners in their class to specific sites that allow them to interact with other people online; Auditory, kinaesthetic and visual learners are better provided for with ICT; Laptops have inspired the students to learn due to the involvement of all their senses; Students should be exposed to concrete experiences, the use of digital images such as the earth's layers or simulation games can provide such concrete experiences; Mouse helps put her fine and gross motor skills into use.* Instead of the simulated body being judged by an individual's embodied experience of the world, pre-service teachers' understandings of the world appear to be informed by, and judged against, the simulated bodies and spaces constructed by online communities. Privileging the experiences of a virtual community over corporeal relationships is symptomatic of the hyperreal and signifies a shift in the principles that underlie understandings of what it means to be part of a community.

To say that a computer program is interactive is to avoid differentiating between information and knowledge, cyberspace and embodied space, communication and dialogue. Hodas (2006) reminds us that “machines require a social organization to become technologies” (p. 212). Pre-service teachers, however, maintain a cybernetic constructivist position when they suggest that an individual only needs a machine to become a social organization: *The computer takes the place of others interaction and assists learning firstly by interacting with the student by presenting tasks and information, secondly by reducing mental processing whilst encouraging higher order thinking.* Such language practices construct a posthuman worldview by blurring and reordering the boundaries between the medium and the message, whereby technology imbues the user with meaning and humans are reduced to a medium for transmitting information. To attribute agency to the machine is to disempower the individual:

The supposed democracy of cyberspace only hands control more effectively back to a centralized elite, the ideology of the free citizen making everyone oblivious to the more enduring deep structures of control. (Sardar, 2000, p. 751)

The key problematic with a position that sees technology as the interactive other, which makes learning easier, is that the learner is constructed as a passive and isolated element in the production of knowledge. Students develop unrealistic expectations that learning should be easier and more interesting because the computer is expected to take care of repetitive tasks such as spelling, identifying relevant information, compiling and storing information, or just making learning easier in general: *ICT is being accepted more easily because of the way it makes our lives easier; Computers also allow students to experiment and fix tasks easily giving the students an opportunity to learn from their mistakes; Easier to correct mistakes.* There is no doubt that computers facilitate the storage, processing and retrieval of information, but it is very important not to forget that an individual’s ability to order and represent the world through discourses is a qualitatively different process, which imbues information with context, meaning and purpose. It is only within discursive frameworks that issues of ethics and values make any sense.

5.5.2 Constructing spaces: Locating the other

While many pre-service teachers refer to Vygotsky’s (1978) social constructivist theory, most of the descriptions used by pre-service teachers in relation to how ICT facilitates student learning and supports social constructivist pedagogies, indicate that their argument

is more in accordance with a stimulus-response, behaviourist model, or the information-flow, cybernetic constructivist model of learning. These models of learning undermine the important role a teacher plays in the classroom. Pre-service teachers write: *Constructivism is when students rely on their environment to further their knowledge and understanding without being specifically instructed; The computer acts as a tutor; With the case of computers, students are seen to be interacting with them in order to promote learning; The computer takes the place of others interaction and assists learning firstly by interacting with the student by presenting tasks and information, secondly by reducing mental processing whilst encouraging higher order thinking.* Again, pre-service teachers rarely articulate any qualitative difference between interaction with a person and interaction with a computer: *Students are able to develop their understanding further through research, inquiry and interaction with both the computers and their peers.*

A shift in student-teacher relationships in the classroom can be seen in pre-service teachers' preference for Rick's student centred classroom: *Rick's class is more student centred than Susan's; Rick demonstrates a student centred classroom; Rick's student directed classroom develops deep understanding.* It appears that students are empowered by the technology as these comments are closely tied to a perception of Rick's students having more freedom to work with ICT. Conversely, Susan is seen to be disempowering students: *Trying to control the learning paths... seems dismissive on the benefits of [ICT] games in terms of engagement, social interactivity and therefore cognitive development; Susan runs a teacher directed classroom; Susan's teacher directed classroom teaches fundamentals; Susan has a teacher dominated approach.* Pre-service teachers argue that ICT facilitates ethical classroom relations by being inclusive, interactive and student centred. Ironically, so much emphasis is placed on ICT as the interactive other that one student asks if there is: *A danger of our classrooms becoming computer centred rather than student centred.*

A computer centred classroom is one in which interacting with simulated bodies establishes a relatively homogeneous social domain, thereby creating a sense of cooperation and collaboration and affirming the self as a social being, while at the same time paradoxically disconnecting individuals from the embodied interactions surrounding them (Willson, 2000). Pre-service teachers, informed by the discourse of interactivity, argue that ICT promotes cooperation and collaboration: *ICT allows learning through*

collaboration and real life situations; The nature of computers encourages collaborative learning so I will incorporate group work and try to develop units with other teachers that utilise ICT. To refer to ICT as an interactive partner in learning implies that simply working online can be said to a form of cooperative learning. There is no need to be engaged with others to be considered a collaborative teacher or student. Sending a bulk email, for example, could be considered a collaborative act.

Pre-service teachers maintain their social constructivist positions by constructing and privileging textual spaces over corporeal spaces. This makes it possible for pre-service teachers to interpret students' ICT use as an authentic form of interaction, even when the students are only working with a software program: *Authentic learning is interactive; Rick's assignments are authentic learning tasks; Rick and Susan believe learning needs to be authentic.* Pre-service teachers argue that ICT use can promote and facilitate a social constructivist approach to learning, as students construct authentic understandings of the world through collaboration with ICT: *Constructivist approaches to ICT in the classroom see computers as a partner to learning; Computers can serve as a collaborative partner in the construction of knowledge; Constructivism strongly emphasises collaboration; Students construct meaning through their experiences; Rick's pedagogy is based on a social constructivist perspective which sees learning as coming through social interaction; ICT is ideal for constructivists.*

The problem with constructing the world through ICT is that simulated others tend to produce and reproduce stereotypes and diminish awareness and understanding of unique corporealities that do not conform to social norms. Gender, race, disability and socio-economic status, for example, are considered to be immaterial, that is, of little consequence in the liberatory social domain of cyberspace. This means that, to mention one's race or disability online is to be deliberately divisive and inflammatory. Nakamura (2000) cites one such example resulting from a petition against racist comments in an online chatroom:

The petition's detractors argue that legislation or discourse designed to prevent or penalize racist hate speech were unnecessary since those offended in this way had the option to hide their race by removing it from their descriptions. (p. 717)

The invisibility of unique corporealities means that individuals rely more heavily on stereotypes to construct their understandings of the other. Stereotypes undermine the

development of more complex understandings of, and engagement with, difference. In this way, the discourse of interactivity represents the “paradox of connectivity” (Willson, 2000, p. 646), as it can both connect and disconnect people.

When the body is invisible, community relationships and hierarchies need to be established and maintained in different ways. Online presence requires constant affirmation, precisely because of the invisibility of the body and this can have a negative affect on embodied relations. A study conducted by the Stanford University Medical Center (2006) notes:

patients' strong drive to compulsively use the Internet to check e-mail, make blog entries or visit Web sites or chat rooms, is not unlike what sufferers of substance abuse or impulse-control disorders experience: a repetitive, intrusive and irresistible urge to perform an act that may be pleasurable in the moment but that can lead to significant problems on the personal and professional levels. (n.p.)

The discourse of progressive bodies extends expectations of the capabilities of technologised bodies. Nevertheless, one pre-service teacher queried the amount of time students might be spending in front of a computer in the ICT case study scenario: *Students attending Maine State School would be spending up to four hours a day connected to the school network and Internet and in front of a computer screen. It was concerning to discover that students home computer and Internet use varied from limited up to thirty-two hours use per week. This means if these students were implemented into a similar program as those students in Maine they could be in front of a computer for up to 50 hours a week.*

The less visible bodies become and the more physically dispersed communities of like-minded people can be, the more individuals become obsessively attached to email and texting devices in order to maintain their sense of social connectedness. Pre-service teachers have noted that students: *End up checking their email or just playing games; Look as though they are working but in fact are chatting to friends on MSN or sending emails; Abuse of email privileges; Emailing in class time such a problem students given ten minutes of lesson time to check emails; Becoming addicted and relying on the use of computers.* Pre-service teachers' reports of students' need to constantly check their emails, confirms, to some degree, the dependent and obsessive behaviours related to excessive ICT use and suggests that ICT can disempower students by diminishing their capacity for

self-regulation and increase their need for the attention of others. Rifkin (2000) writes, “Descartes’ dictum ‘I think therefore I am’ has been replaced by a new dictum: ‘I am connected therefore I exist’” (p. 209). The more students rely on ICT for self affirmation, the greater the potential of ICT to regulate student behaviours.

5.5.3 Ethical spaces: Collaboration or competition

The ability to share information and resources, especially within and across schools with the click of a button is remarkably empowering for teachers and students. As any teacher knows, however, excessive reliance upon emails, sometimes to the point where teachers will not walk next door to see if their colleague is in their room, can actually undermine attempts to communicate, as teachers and students may spend hours a day sorting junk mail from relevant and urgent information. Furthermore, texts unaccompanied by subtle gestures, tone of voice, emphasis or facial expressions can be easily misinterpreted. Capital letters, loud colours and audacious fonts can be misread, draw inflammatory responses and undermine collaboration.

Pre-service teachers are very much aware of the importance of promoting healthy bodies and ethical relationships: *Students are motivated to become self-directed and ethical people, being ethical, maintaining well being, creating and pursuing goals and cultivating a sense of identity and relationships to others; Presence is important; Meaningful relationships come through the communication and closeness between human beings.* The conflicting demands, however, of providing students with access to the information superhighway, while at the same time being held accountable for the wellbeing of students in uncontrollable and invisible online communities, is an ongoing ethical dilemma for teachers. Nevertheless, governing bodies and educational institutions continue to promote the use of ICT, while avoiding responsibility for the social costs that are incurred by the technologies they promote. Hodas (2006) writes:

Given that many such systems raise important ethical issues, the question arises as to why some computer professionals often seem untroubled by their advocacy ... others maintain that computer science is a technical discipline, unconnected with value questions. (p. 633)

Pre-service teachers acknowledge that much can be gained through ICT use: *Much more unbiased and educated research as it is much quicker to access many different authors and points of view; Rather than replace the teacher they speed up the process of*

information transmission. Pre-service teachers argue that increased student engagement is the result of ICT focusing more on the individual, making learning student-directed, faster and easier. To value the speed of interactions, however, is to lose sight of how knowledge and corporealities work together to produce an ethical dimension through which subjects and power relationships are established. While Gerver (1986) acknowledges the appeal of computer work for students, writing:

Each student can progress at his or her own speed, concentrating on those parts of the learning experience that he or she finds of greatest value rather than being constrained by the needs and wishes of the other members of a group. (p. 59)

Greenfield (2003) problematises this position, arguing that:

The problem with an IT-based education, with the focus on the individual going at their own pace for their own individual needs and curiosities, is that surely there will be an inevitable loss of direction in terms of what we are learning as a cohesive society ... and individual curriculum might be the ultimate dumbing down. (p. 178)

Interacting with the computer encourages students to work as individual units in the classroom, thereby fostering the impression of freedom and independence. This can not only isolate the student from the different approaches to problem solving and perspectives of others, but also promote a competitive, rather than collaborative attitude to learning:

most computer games foster a spirit of intense, often speed-ridden competitiveness either between the individual and the machine or between two individuals. (Gerver, 1986, p. 43)

ICT certainly facilitates communication and networking but paradoxically “the whole ethos of the commercial computer world is highly competitive” (Gerver, 1986, p. 24), and, therefore, divisive.

If the aim of education is to maintain the status quo and assimilate marginalised perspectives into a hegemonic worldview, then a behaviourist, stimulus-reward pedagogy in a competitive environment is non-problematic: *There is a direct interaction between the user and the reward; Online maths games where students compete for high score to enter their name in the hall of fame online*. A trained and pacified individual can pose no threat to the existing order. Nor would unequal gendered relations need to be questioned as gendered technologies simply reflect a common sense, hegemonic, social reality in which bodies are for girls and technologies are for boys: *Girls enjoy the use of computers as well*

but not as often or as much so as boys. They prefer social interaction and working in groups. Therefore, this may affect the levels of computer literacy between males and female; Females tend to find computers as a tool and see the perceived problem; Boys see computers as a toy, they experiment with its use developing a higher self-efficacy in its use, demonstrating Wajcman's (2004) point that:

In contemporary Western society, the hegemonic form of masculinity is still strongly associated with technical prowess and power. Feminine identity, on the other hand, has involved being ill-suited to technological pursuits. Entering technical domains has therefore required women to sacrifice major aspects of their gender identity. (p. 112)

The discourse of interactivity places more responsibility on students to form their own synthesis and relegates the teacher to the margins of teaching and learning processes: *Computer programs can be designed to cover these aspects where students collect data on the self and how they can interact effectively in the community; Rick uses buddy system so learning mostly takes care of itself.* This encourages the fragmentation of knowledge instead of a historical awareness of how knowledge of the world is constructed and how it can be changed. Consequently, both cybernetic and behaviourist pedagogies disempower the student by locating them within a self-referential information loop that denies the agency of unique corporealities in constructing alternative versions and perspectives of the world. Such approaches to teaching and learning makes invisible the important role teachers and students can play in counteracting the socially divisive effects of computerisation.

Pre-service teachers work hard to incorporate ICT discourses into critical, constructivist pedagogical framework and smooth over the gaps and tensions between the two discourses. Some pre-service teachers concede that while some things are gained through ICT use, other things are lost: *Loss of eye and most other contact with teacher; All heads turn to face monitor; Concerns over the quality of social skills being developed and why; More time is spent with computers as the teaching and learning authority; Students developing cyber-relationships and begin to become less social and shy or anxious; To avoid face to face contact.* To remember the multiple perspectives afforded by corporealities is to remember the importance of nurturing ethical relations within a community:

The problem with an IT-based education, with the focus on the individual going at their own pace for their own individual needs and curiosities, is that surely there will be an inevitable loss of direction in terms of what we are learning as a cohesive society. If, rather than thinking, everyone is having an experience with interactive and personalised pedagogic programmes, how might we make progress in increasing our common, shared knowledge-base ...? (Greenfield, 2003, p. 178)

Most pre-service teachers argue that balance is that key: *It should never serve as a replacement to delivering instruction*. Pre-service teachers, however, can be caught up in the self-affirming reality of ICT discourses. To write, for example, as one pre-service teacher did: *In Rick's case, the computers engage the students through engagement, which is a form of intrinsic motivation*, is to focus on effects instead of underlying causes, and to make invisible alternative outcomes and possibilities. A focus on effects can also be demonstrated by the concept of identity tourism (Nakamura, 2000). Identity tourism refers to the ability of the internet user to assume any gender or racial identity without committing to the experience of living day to day as a minority subject in corporeal world. As ICT discourses draw from not only the language of science and science fiction, but also the familiar texts of popular culture in general, the result is not liberation from hegemonic conventions, but an affirmation of the prevailing Western worldview:

quite in contrast to the early belief that cyberspace offers a way to escape gender, race, and class as conditions of social interaction ... online discourse is woven of stereotypical cultural narratives that reinstall precisely these conditions. (Punday, 2000, p. 6)

In the same way, claims of increased student interactivity through ICT use can be justified by pointing out the effect as being focus and engagement, even if students are only engaged in "transitory and shallow relationships from instant e-mail" (Stoll, 1995, p. 148). The effect is engagement and interaction but the cause is the desire for self-affirmation, not a desire to engage with and understand difference.

If pre-service teachers believe that engagement means that students sit still for hours on end at a computer terminal and accept the interactive protocols maintained by the software, then students will learn that the world is a passive, pre-programmed place: *Computers were viewed as baby sitting devices; In some cases as electronic pacifiers*. Teachers' emphasis on the engaging effect of instant feedback overlooks the importance of delayed feedback in teaching students how to delay gratification and consider the needs of the

group over the individual. Delayed feedback means that students are given time to reflect on their performance rather than approach it in a hit and miss manner.

If pre-service teachers believe that: *Interactive software is taking the student closer to their development potential*, then students will be encouraged to judge themselves against the simulations and cyborg metaphors that represent the future of human evolution: *Students of this generation have grown up with computer, they literally live and breathe them; ICT a condition of change; computers are becoming a requirement to survive; More than ever, humans depend on technology; This dependence will increase exponentially over a student's lifespan; An inevitable shift; survival of the fittest.*

If, however, education aims to promote an ethical and equitable society, one in which self-regulating individuals are willing to acknowledge and respect the uniqueness and ambiguities of other corporealities, then teachers and students must engage with embodied beings in a continuous present. Seen as an effect of the choices we make in the present, the future then becomes a modifiable potentiality and not a fixed destination. Community is the person next to you in the present, not the person you want next to you at some point in the future. To be obsessively future oriented is to abrogate responsibility for present relations within the world. Pre-service teachers must be empowered to resist ICT discourses that focus primarily on the future and on disembodied others and engage with the important question of how ethical relations can first be played out in the embodied spaces of the classroom, where students from different backgrounds, who look different and act differently, have to learn to live and work together:

Real community creates context. It generates issues which arise with relations to time and space, history and contemporary circumstances... which is why so many issues are difficult, they require balancing of opposing pressures.... The essence of real community is its presumptive perpetuity – you have to worry about other people because they will always be there. (Sardar, 2000, p. 751)

5.6 The discourse of literacy: Constructing intelligence

Reification works in the following way: we use the word intelligence to refer to a variety of human capabilities of which we approve. There is no such thing as intelligence. It is a word, not a thing, and a word of a very high order of abstraction. But if we believe it to be a thing like the pancreas or liver, then we will believe scientific procedures can locate it and measure. (Postman, 1992, p. 132)

The discourse of literacy represents the skills and knowledges promoted by pre-service teachers. While pre-service teachers frequently refer to ICT's potential for augmenting students' higher order thinking skills, this thesis has argued that any definition of higher order thinking, or intelligence, is dependant upon the literacies or language practices, promoted by institutional discourses. In cybernetics, for example, any self-regulating system is considered intelligent. Hence a thermostat can be considered an intelligent machine (Wiener, 1967), and Bigum and Green (1992) write that, "in the field of Artificial Intelligence, the adjective 'intelligent' is now an almost mandatory descriptor for any computational activity" (p. 8).

Intelligence is a highly abstract concept that does not represent an immutable or innate quality of the individual, but is an effect of cultural contexts within which the individual's ideas, attitudes and values are informed through patterns of interaction with the world around them. For this reason, the discourse of literacy, which focuses on the skills and knowledges that signify and demonstrate intelligence, is deeply enmeshed with the discourse of posthuman pedagogy. Pedagogy refers to the art and science of promoting culturally appropriate forms of values and beliefs, and the intelligent subject is constructed through their articulation of culturally accepted ways of being and knowing, that is, through their literacy practices. In this respect, literacy represents not only a cultural aspiration (Venezky, 1990), but also an attempt to construct a homogeneous social reality. Literacy is a technology that serves the selective function of maintaining the stratified relations of the current social order.

5.6.1 Literacy: Constructing human potential

Intelligence is demonstrated and mediated by literacy practices. Intelligence, therefore, like information, has no intrinsic meaning (Postman, 1992) and yet schools are responsible for "legitimizing some parts of the flow of information and discrediting other parts" (Postman, 1992, p. 63). Pre-service teachers are unable to assess student intelligence, as an object of knowledge, outside the discourses of educational institutions that authorise who and what can be acknowledged as intelligent or intelligible. The discourse of literacy, like the discourse of posthuman pedagogy, demonstrates how pre-service teachers struggle to fill the gaps between discourses that construct an unnatural separation between teaching and learning. The separation of the two phenomena through binary language structures, redirects pre-service teachers' attention away from broader

social, cultural and political contexts. Losing sight of the broader landscape of knowledge practices allows pre-service teachers to construct discrete literacy skills as neutral and autonomous elements of education and enables the production of fragmented and inconsistent pedagogic approaches, which operate in tension with each other. The lack of a coherent, critical literacy framework diminishes the possibilities for purposeful, ethical social design and supports the current social order by avoiding or obscuring the teleological and political agendas of hegemonic regimes.

Pre-service teachers' fragmented perspectives of literacy as discrete sets of skills are demonstrated in the following comments: *Students must be computer literate; Every student should be given the opportunity and time to refine their skills in the functioning of equipment; Many students excel at computer skills; The majority of students are information literate and know how to read and understand the semiotics involved with computers; Our students are already computer literate and harnessing this enthusiasm and channelling it into learning can only end in positive results; It's also important that all students have the same basic computer literacy and knowledge of operating the systems; Students need to be confident competent ICT users; It is widely accepted that all children are computer literate; Children are great at playing computer games; Most children can learn about computing principles; Most students now growing up with ICT and quite fluent with basics; Students should be literate in multimodal texts including ICT; Use of computers help students to fit into society; Necessity for students to understand new forms of communication; Students competent at accessing the internet and information.* Pre-service teachers' use of the term literacy in this context focuses on a range of diverse skills including technical operating skills, information literacy, programming skills, general familiarity, the ability to play computer games, multi-modal literacy and communication skills. Stoll (1995) openly admits his confusion:

To one person, computer literacy means that a student can type on a keyboard. Another sees it as the ability to use standard tools to send, copy, or delete files. A third expects students to be able to write a simple program in BASIC. One teacher showed me an exam where a student had to describe the functions of different pieces of hardware. (p. 132)

The discourse of literacy constructs, and is itself a product of, privileged forms of language use within a given community. Pre-service teachers' diverse literacy discourses,

however do not cohere with the aspirations of policy writers who argue the benefits of a, one literacy fits all, approach. Venezky (1990) writes:

Although we can define differing types of literacy for different regions of the country, different social strata, and different levels of involvement in society, from a national policy perspective equality of opportunity is the standard and, therefore, only a single definition of literacy has meaning, applied to all citizens. To accept different definitions of literacy for different regions of the country and to promulgate policies that would tend to perpetuate these differences would be inconsistent with the current equity goals of this country. (p. 10)

The irony of taking up such a stance towards concepts of literacy and literacy policy explains the recurring phenomenon of the literacy crisis. The more policy writers insist on standardising the rich diversity of uniquely located corporealities, the more visible and problematic anomalous literacy practices appear. Paradoxically, the intention to empower individuals within educational systems through the promotion of language and literacy awareness across the curriculum has been undermined by the homogenising, regulating effects of such practices. Terms such as ICT literacy, cultural literacy, music literacy, arts literacy, numerical literacy and spatial literacy redefine pluralist learning communities, not in terms of what they contribute to each other, but in terms of the specialised language practices that delineate key learning areas for education. This separation facilitates standardisation and testing, thereby ensuring that negative feedback remains a powerful element of educational practice (Heffron, 1995).

The construction and realisation of individual potential is both enabled and constrained by normative, hegemonic discourses. The potential of the literate subject is powerfully informed by how closely the embodied subject coheres with, or deviates from, the normative white, male, western, healthy body. As a result, the concept of potential can work to both enable and delimit the subject's unique potential as gender, class, race, or dis/ability are inscribed upon individual corporealities. Pre-service teachers provide examples of textual practices that can effect a redirection of female potential away from ICT to more sociable, nurturing roles: *Girls enjoy the use of computers as well but not as often or as much so as boys. They prefer social interaction and working in groups.* This supports the position that:

Embedded in every tool is an ideological bias, a predisposition to construct the world as one thing rather than another, to value one thing over another, to amplify one sense or skill or attitude more loudly than another. (Postman, 1992, p. 13)

The ability to measure student intelligence through their signifying practices supports the organising principles behind education and informs pre-service teachers' understandings of student potential. Educational discourses, particularly those related to inclusive practice, promote the development of individual potential and evidence of this support is substantiated by administrative processes, which test students' literacy levels, at various ages. The pre-service teacher, who writes of the: *Need to assess student understanding of task and measure knowledge*, accedes to an administrative perspective on teaching and learning and reifies literacy or intelligence as an unproblematic, quantifiable product of good classroom practice (Postman, 1992).

Pre-service teachers' use of terms such as potential, intelligence and literacy, which represent social aspirations and values, suggest that educational processes serve the teleological function of identifying and nurturing innate, latent human qualities. The discourse of literacy signifies a desire to attain higher states of being by promoting some ways of being literate over others: *Children are more adept at using computers before they reach school than can read or write; Able students should aid struggling students to become literate in ICT*. Pre-service teachers' discursive practices construct children's rapport with computers as a natural development in their communicative practices. Pre-service teachers construct ICT use as essential for laying the groundwork for future literacy practices even before children can read or write and through the examples students set for one another.

5.6.2 ICT literacy and higher order thinking

The discourse of literacy constructs literacy as a means for achieving one's potential. Educational processes are intended to help learners to achieve their potential. The discourse of literacy, however, also promotes the unlimited expansion of human potential through new technologies. Consequently, the potential of the learner becomes a nebulous concept, an ever shifting, discursive construct that is neither naturally manifested nor objectively quantifiable.

To refer to someone as intelligent is to refer at the same time to an agreed knowledge framework that provides benchmarks for evaluating intelligence. Intelligence is, therefore a concept that emerges as an effect of privileged discourses. Pre-service teachers articulate their ability to work with educational discourses when they use terms such as metacognition, reflection, mental processing, deeper understanding and higher order thinking: *Use of computers in the classroom can enhance students metacognitively; Rick uses his computers to promote deeper understanding more effectively than Susan; As part of the thinking element [of ELS] computers can encourage reflective and inquiring thinking among students; The computer takes the place of others interaction and assists learning firstly by interacting with the student by presenting tasks and information, secondly by reducing mental processing whilst encouraging higher order thinking; the computer by its nature allows students to be active problem solvers.*

Deeper understanding and higher order thinking are constructed by pre-service teachers as important outcomes that students should demonstrate and teachers must recognise and assess. Not one pre-service teacher, however, attempts to explain what is meant by deeper understanding or higher order thinking, and how it can be identified, although one pre-service teacher did make the point that teachers are held accountable for the development of these abilities in their students: *Students' deep understanding are vital in this era of teacher accountability.*

Drawing from pre-service teacher discourses that construct the role of ICT in education, however, higher order thinking is implicitly associated with the following: problem solving skills, critical thinking skills the ability to identify errors in spelling and grammar, a drive to inquire, experiment and solve problems for and by themselves, a habit of life-long learning, ICT literacy, an ability to turn information into knowledge, improving presentation of work using ICT, adapting from ICT work to non-ICT work, developing visual intelligence, learning by doing, willingness to teach ICT to those less ICT literate and fitting into society through ICT use. Some examples provided by pre-service teachers are: *Need to teach students to be life long learners to discriminate between good and bad information; Students must discriminate, question, explore, inquire for themselves; In order to use ICT to the best advantage we need to incorporate it into our teaching methods so that skills such as problem solving, reflective thinking, critical analysis can be developed; How can a student verify information; No way a student can ascertain validity*

of website info; Students won't criticise the site's grammar and punctuation; Learning through action on the laptops will teach the students to be critical analysers of media.

Pre-service teachers' comments suggest that ICT augments higher order thinking. References to metacognition, problem solving, reflection and inquiry, indicate that pre-services teachers' use of the terms, deeper thinking and higher order thinking, signify the ability to move between discursive domains in order to transfer information from one domain and apply it to another. This concurs with Lewis and Smith's (1993) definition:

Higher order thinking occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose of finding possible answers in perplexing situations. (p. 136)

The definition of higher order thinking as a lateral shift across discursive domains, however, is immediately undermined by suggestions that ICT facilitates students' higher order thinking by doing the lower order thinking for them: *Time saving by using the computer to replace laborious grappling allowing greater thought into what was being taught potentially promoting deeper understanding and encouraging metacognitive development in these grade 7 children and using the online resources to check information where opening a text book would have proved too difficult.*

Pre-service teachers, in separating and valuing one learning process over the other, underestimate the importance of encoding and decoding skills for facilitating innovation and creativity. Understanding how language conventions work, for example, empowers the individual by making visible and therefore negotiable the dominant discursive frameworks which maintain the boundaries of what can be said, and is, therefore fundamental to the development of critical or reflective thinking. Pre-service teachers' use of the term higher order thinking, therefore, immediately presents a problematic binary that constructs higher and lower order thinking skills as two separate processes.

Pre-service teachers engage with the ambiguous and problematic relationship between higher order thinking and lower order thinking when they take into account how these competencies, or lack of them, can be demonstrated through ICT use in the classroom: *Over reliance on technology can also be detrimental; Deeper thinking can only be achieved if students are engaged in lesson content, not just the appreciation of the tools being used; This contributes to students understanding computers but not the subject*

matter; Students don't make personal meaning when they don't rework; Concept of plagiarism needs to be discussed; Students who don't have these skills cut and paste and plagiarise; There appears to be no real thought involved in retrieving info; Almost 40% of students cut and paste without reference; It is of no use to a student if he can use an online Atlas yet does not know which countries he is looking for; Student would gain computer skills yet neglect the focus of the learning experience. Pre-service teachers struggle to control the direction and level of teaching and learning in the murky confluence of ICT and educational discourses. In addition, Stoll (1995) makes the case that "the emphasis on writing tools – outliners, hyphenators, spell checkers, laser printers – takes the students' minds off the main task: to think" (p. 141).

In terms of identifying the key literacy skills necessary for the subject to operate effectively within a fast capitalist culture of constant change, pre-service teacher discourses support the state's political agenda of returning to the basics in order to ground the individual in the more stable traditions of the literacy essentials by pointing out that students are: *unable to understand or spot basic errors*. At the same time, however, pre-service teachers acknowledge the ICT rhetoric, which promotes a future of constant, technological innovation and takes up the vocational agenda of providing flexible computer skills and higher order problem solving skills: *But this is a new world and we need to be real ...the world is moving at a fast pace, students need to be ready to deal with constant change so they are able to cope in a world that moves technically forward second by second; The future is computer oriented and student learning is becoming more computer-base; Change is important. We must allow ourselves to embrace it.*

Pre-service teachers' are aware of the need to develop inclusive classroom practices. They argue the relevance of new literacy practices for supporting the needs of individual learners: *More inclusive as computers can cater for the needs of a range of learners; The ability for students to have self regulated learning.* This position again promotes a basic skills approach as it does not promote critical literacy practices that enable the learner to engage with the more complex, dialogic relationships with diverse and often resistant corporealities. Nevertheless, an attempt to establish the link between basic literacy skills and higher order thinking is made by one pre-service teacher who takes up a more critical stance, writing: *If students do not develop the fundamental understanding of what a graph is, how to draw one and how to read one, they will forever be at the mercy of the machine.*

Students need to understand, and define the limits of conventional literacy practices before they can effectively challenge those practices. Morgan (2001), however, points out that:

having control in particular forms does not necessarily encourage people to hybridise them: that requires a particular attitude towards those established forms. (p. 42)

Morgan's point is substantiated by pre-service teachers' literacy practices. Pre-service teachers demonstrate higher order thinking skills when they work to combine, integrate and explain new and uniquely contextualised experiences such as the individual learning processes demonstrated by students through ICT use. The discursive techniques pre-service teachers use to fill the gaps between ICT and educational discourses represent the complex literacy skills of interpolation, extrapolation and reinterpretation. Interpolation is the filling in of information that is missing from a sequence, extrapolation is extending an incomplete argument and reinterpretation is the rearrangement of information to effect a new interpretation (Lewis & Smith, 1993). These problem-solving processes can potentially inform and promote a critical pedagogy by identifying what perspectives are missing from a pedagogic discourse, how those perspectives can be included and how pedagogy might change as a result. The failure to develop critical pedagogies, however, means that the majority of pre-service teachers, in their efforts to accommodate contesting discourses, take up a compliant and reactive stance towards changing literacy practices.

5.6.3 Constructing the independent learner

Paradoxically, while ICT is constructed as the active other in the discourse of interactivity, ICT is constructed as the passive other in the discourse of literacy. Pre-service teachers' use of social constructivist theories in this context constructs independent learning as "students' almost unguided, individual discovery of knowledge for themselves" (Morgan, 2001, p. 37). Pre-service teachers write: *Rick's students engage in discovery learning where students discover knowledge through active participation in their own learning; Effort should be placed to allow students to inquire for themselves; Rick's students learn by experimentation and experiences; Computers are great for encouraging students to drive their own learning.* Glassman (2001) problematises this position, writing:

If humans do not see themselves in the context of social views different from themselves, they are unable to reconstruct themselves in the face of a problematic society. Unable to change themselves, and, therefore, unable to change the world, humans become slaves to their history and to their habits. (p. 4)

The discourse of interactivity supports the discourse of literacy by re-informing pre-service teachers' definitions of interaction. Interaction and independent learning carry different meanings in different discursive contexts, the parameters of which are constantly shifting but not so easily identified by pre-service teachers, who take up self-contradictory positions as a result. Words can:

cross discursive boundaries, spanning multiple world-view, interest, and value systems. They all carry positive connotations and name ideals to which people who embrace different – and often incompatible – aspirations, purposes, interest, and investments claim allegiance. The problem is that when matters come down to the level of lived social practice, these seemingly shared terms refer to very different ideals across different communities. (Lankshear, 1997, p. 91)

Pre-service teachers take the position that students learn best when they take control of and feel responsible for their own learning, and the role of ICT is to facilitate the process of independent learning: *Students cannot be passive learners; Ricks' students learn by inquiry; Rick's students presumed responsibility for own learning; Assist them in independent learning; Rick's students were independent learners.*

The discursive technique that constructs ICT as an interactive other is also used by pre-service teachers to explain how ICT can also facilitate student learning by scaffolding information, thereby enabling students to work in their zone of proximal development: *By having their own laptops the students are free to experiment and build on top of their prior knowledge.* Pre-service teachers construct ICT as undertaking a “range of educational work, including instructing, advising, coaching tutoring, even teaching” (Bigum, 1997, p. 249): *The students, through more interactive experience with their peers and the computers are able to take greater responsibility for their learning and work in their zone of proximal development; Different levels are catered to by the computer.* The more a student works independently with ICT as the interface between the self and the world, however, the more efficiently students can be enculturated into the discursive practices of ICT specialists who act as the gatekeepers of the new literacies and new social domains in the digital era. In this respect, ICT is not a neutral pedagogic tool. ICT represents a means of inducting teachers and students into the logic of automated information systems: *Everyone's work looks the same; Students do mindless google searches and accept answers as knowledge.* Independent learning in this context does not necessarily promote the development of creative and critical literacy skills.

When students interact with each other online, the computer serves as a homogenising medium, smoothing out the collaborative learning process by establishing the patterns, conventions and parameters of, and for, interaction. In this way, the term collaboration can take on:

quite a different colouring depending upon whether people are mutually collaborating on generating purposes, goals, visions and ends, or simply cooperating to carry out a pre-given agenda within a system and vision they have had little say in forming. (Lankshear, 1997, p. 93)

If students interact with ICT as the passive other, then intelligence, demonstrated through literacy practices, is constructed as the ability to work with, not question, established social norms. Accordingly, ICT, as the passive other, operates as a form of uncompromising resistance, refusing to accommodate or negotiate, thereby undermining, rather than encouraging, the development of critical and creative problem solving approaches to meaning making processes. One pre-service teacher writes: *Students must be encouraged to interact actively using ICT*, acknowledging the danger of students acting as passive counterparts in human/machine relationships. Computer users, for example, quickly learn to comply precisely with ICT conventions when entering information in an email address field, because ambiguity is not tolerated in this context. Consequently, instead of focusing on creative design, problem solving skills focus on the identification of student or teacher input error. This point is supported by Heffron (1995) who claims:

cybernetic approaches to the human factor in industrial design bear a striking resemblance to the way in which cognitivists define the role of the student and the teacher in the computer-assisted-classroom, but more generally in any learning situation where the root metaphors are those of “information processing” and “automaticity”. (p. 500)

Pre-service teachers’ understanding of independent learning makes it possible to argue that ICT encourages students to work in their zone of proximal development. Pre-service teachers argue that ICT scaffolds student learning by providing pre-designed, standardised, levels of teaching and learning software programs. This signifies reductionist pedagogies, which construct teaching and learning as two complementary, but basically autonomous processes. Furthermore, to ensure independent learning, these two processes are ideally mediated by the computer screen, which is constructed as a neutral interface which works to erase the discursive tensions between teacher and student bodies.

The homogenising effect of ICT, as a passive mediator of communicative processes, reduces the dialogic tension between students and teachers. Dialogue and debate are literacy practices which have been marginalised by the discourse of literacy. Pre-service teachers focus instead, on speeding up the flow of textual information by smoothing out the resistance of embodied nodes in communication networks. Ironically, these nodes are the sites upon which meanings are inscribed. To take away the uniquely embodied perspectives and knowledges that construct meaning, is to reduce texts to pure information, as meaningless and dislocated noise, at the same time undermining any sense of responsibility for the effects of those texts upon others.

The discourse of literacy constructs information as a neutral signifier, which does not warrant ethical consideration. There is no compunction to locate, or understand, or relate to, the source of textual production. Priority is given, instead, to the efficiency production of information and its circulation. Postman (1992) voices a concern that this definition of information rejects “the necessity of interconnectedness, proceed[s] without context, argue[s] for instancy against historical continuity, and offer[s] fascination in place of complexity and coherence” (p. 69). In this context, literacy is not about developing critical understandings for the purpose of promoting ethical relationships between individuals and across community groups. In the information age, literacy is a commodity.

The majority of pre-service teachers are concerned with students’ abilities to question and engage deeply with texts at an ethical level: *So much information; Searching irrelevant sites; When researching, students often cut and paste; URL information may be inaccurate; No way a student can ascertain the validity of website information; Students don’t make personal meaning; There appears to be no real thought in retrieving information; How can a student verify information?; Almost 40% of students cut and paste without reference.* While pre-service teachers argue that ICT promotes independent learning and higher order thinking they also complain that: *Everyone’s work looks the same.*

Furthermore, the speed with which hoaxes, rumours, viruses, and jokes (Burbules, 2001) can be disseminated online, however, demonstrates how eagerly and uncritically texts are accepted and passed on as public information. Without critical literacy skills, having the freedom to create within an ICT environment can have the undesirable outcome of

students abrogating responsibility for their texts the minute they become part of the public domain. Online texts may be taken up, reproduced, changed and used for a number of purposes for which they were never originally intended. The instability and shadowy origins of online texts undermines any sense of long-term responsibility. Most pre-service teachers point out that: *Plagiarism needs to be addressed.*

Pre-service teachers argue that students demonstrate greater responsibility for their own learning by working independently of others. Constructing understandings of the world through electronic information networks, however, changes the nature of social relationships. The discourses of progressive bodies, literacy and posthuman pedagogy, therefore, are deeply enmeshed with the discourse of interactivity as the development of the ethical subject is dependent upon the enactment of reciprocal relationships within an embodied community:

There are likely to be problems at any time, arising out of unresolved differences in the individual's discursive history, the individual's present discursive location and the context of discourses in interactions. That difference is the motor that produces texts.... Texts are therefore manifestations of discourses and the meanings of discourses and the sites of attempts to resolve particular problems. (Kress, 1985, p. 12)

The dissolution of embodiment through the use of cyborg metaphors and the promotion of normative discourses in electronic domains, explain the observation of one pre-service teacher that: *Everyone's work looks the same.* As students work to accommodate new technologies through new literacy practices, they develop the automatic and purely procedural responses that best suit the machine. Stoll (1995) explains that, "computer programs feed us someone else's logic, instead of encouraging us to develop our own" (p. 122). Contradicting their own argument that ICT use develops students' higher order thinking skills, pre-service teachers frequently describe classroom contexts in which the "role of the human 'novice' is often simply to gather data and to 'accept the machine's solution'" (Heffron, 1995, p. 510): *Students do mindless google searches and accept answers as knowledge.*

Papert (as cited in Gerver, 1986) points out that "true computer literacy is not just knowing how to make use of computers and computational ideas. It is knowing when it is appropriate to do so" (p. 83), and many pre-service teachers accommodate this position, acknowledging the importance of a balanced pedagogical approach for exploring the

uniquely creative capacities of corporealities: *Many will always prefer pen and pencil and paper as it allows more freedom of expression and helps concentration; Some students actually benefit from the hands on approach that producing these models offer.*

Powerful ICT discourses, however, continue to validate those literacy practices that encourage people to think in ways analogous to those of computers (Gerver, 1986) by always shaping or limiting ways of using words, thinking, and working to accommodate the discourses that promote the capacity of the machine: *Computer-savvy students of a post MTV generation have different learning styles and requirements that requires teachers to keep up and look forward to a future full of integrated circuits; It's what they relate to, it's the technological age.* The government model for standardised literacy testing, for example, offers a useful analogy for demonstrating how ways of promoting and acknowledging creativity as new literacies can be limited by the capacity of administrative discourses:

Teaching and learning in schools have become increasingly mediated by standardized testing and other crude indicators of performance. ... They denote an abstract standard of performance rather than what students in specific communities can actually do. Instead of responding to the uniqueness of individual students, teachers are obliged to classify their performance, which means that they run the risk of not seeing what they do at all. (Brenton, 2007, p. 37)

Creativity is a highly problematic concept as it demonstrates signifies higher order thinking through the development of new textual practices while at the same time such a definition places genuinely creative texts outside of the regulatory discourses that provide a means for determining the value of such texts.

Informed by the discourse of posthuman pedagogy, teachers are under pressure to demonstrate not only how ICT enhances creativity in their own practice, but also their ability to recognise it in others: *ICT allows Rick to create instruction that moves away from rote instructional processes and incorporates a new form of literacy; Safe to assume that Rick's students are more creative and confident to explore an experiment with ICT; There is no limit to one's imagination when using a computer; Creativity helped out by computer use... most students used graphics & fancy fonts; Rick's students were more creative in using ICT as learning tools; Rick's students more creative in laptop use; students actively seek ways to present work by implementing technology.* One pre-service teacher, however, voices the concern that the technology represents a benchmark for

teacher competency or intelligence, as technical issues constitute problems solving tasks for teachers: *Technological problems are not an issue, they are a challenge, requiring creativity of thought to overcome.* This is significant for shifting teachers' pedagogic focus as each successive generation of students will bring the latest technologies and technological discourses with them to the classroom and demonstrate creative textual practices that may slip under the radar of teachers' literacy discourses and assessment practices.

5.6.4 The paradox of expanding and contracting literacies

The paradox of expanding and contracting literacies refers to the ways in which language not only constructs human reality and enables communication around the globe but, also the ways in which language divides communities and separates knowledge practices. Pre-service teachers' understandings of the integrative role ICT plays across the curriculum is complicated by their understanding of ICT as a technology that can both expand and limit the social potential of the individual: *ICT presents a whole new language and range of skills to become proficient in; Computer illiteracy compounds student learning problems; Not all students are literate when it comes to technology; In my prac there were as well numbers of students lack of basic knowledge to use a pc; Students' knowledge is surprisingly less than expected re ICT; Assumed that all students at different stages of computer literacy; Level of computer literacy could affect the progress of learning; After over 10 years working in the IT industry I am acutely aware of the amount of ignorance that still exists today; Must avoid penalising students for poor computer literacy.* Pre-service teachers, are clearly concerned about the stratifying effect of ICT in terms of setting up a digital divide between those who possess basic ICT skills and those who do not, especially when considering the policy and funding imperatives that promote ICT as a means for integrating the curriculum (Bigum & Green, 1992). While the line between literacy and illiteracy is problematic, the discrete set of ICT skills that enable the individual access to the information superhighway is increasingly becoming a key indicator of social competency:

The basis for perceiving literacy as a unitary thing typically lies in the belief that literacy is a technology or, alternatively, the skill to employ the technology of print. An analogy may be drawn here with computing. People are either in a position to use computers – they possess the technology and skills to use it – or they are not. (Lankshear & Lawler, 1987, p. 39)

The assumption is that those who are not ICT literate do not have access to information and are unable to make use of the ICT processes that promote the development of higher order thinking skills. Lankshear's (2006) work on a new framework for literacy resolves pre-service teachers' assessment dilemma of their students' ICT practices in terms of skill levels, by accommodating the range of pre-service teachers' discourses of ICT literacy. Lankshear (2006) describes four constructions of literacy: the lingering basics, which are conventional and privileged ways of decoding and encoding texts; the new basics, as critical literacy skills for questioning and problem solving; elite literacies, which are the specialised discourses authorised by academic disciplines; and foreign language literacy, which operates not only as an elite literacy, but also makes visible the non-English speaking, global communities that are frequently invisible in Australian literacy debates.

5.6.4.1 Literacy as the lingering basics

Lankshear's (2006) concept of expanding and alternative communities of literacy practices is useful for understanding literacy in terms of cultural effects as opposed to a demonstration of learners' cognitive processes. Pre-service teachers conceptualise ICT literacy in terms of lingering basics when they foreground the fundamentals of encoding and decoding print texts: *Many students have difficulty with traditional tasks; I noticed many students loved accessing Shakespeare study notes online, but I had read-aloud time in classrooms so that at least I knew they were reading the text and not merely using computer resources as students disliked reading the actual texts; Students should experience skills both ways, with and without ICT; Some students skilled with pen and paper, others with ICT; Students still need traditional skills; Students who struggle to read and write are disadvantaged by computers; Due to increase of ICT for class work this skill gap seems to be shrinking fast; Teachers must teach skimming, scanning, note taking; The mouse helps put her fine and gross motor skills into use; Many students have difficulty with traditional tasks.* The lingering basics described here relate to generic operational skills that enable access to and operation within, the individual's immediate community of textual practices. Some pre-service teachers consider the encoding and decoding skills that represent the traditions and conventions of language practices to constitute an integral part of more complex literacy practices: *students with greater linguistic skills operated computer at higher level; more capable students able to use and extend ICT skills.* Lankshear and Knobel (2005) explain that when people have these skills

“they can read and write information effectively. They can put it to use in consuming and producing information in all kinds of setting and roles” (p. 6).

5.6.4.2 Literacy as the new basics

Pre-service teachers engage with ICT literacy as the new basics when they consider ICT literacy from a critical literacy perspective: *Do Rick and Susan explicitly teach the language and culture of computer world?; Teachers must give students the skills and knowledge base to inquire for themselves; Being literate/numerate both traditional and new tech forms of pedagogy must be included in curriculum giving them skills for today and tomorrow; Make worthwhile contributions to society, enjoy the pleasures of reading and influence decision makers.* Lankshear (2006) argues that the new basics should enable students to engage with and critique the qualitative shifts in the social practices of modern society. His literacy framework defines the new basics as “a combination of critical thinking – a generic grab bag for higher order skills for comprehension, problem solving and analysis – and reading, writing, speaking and listening” (p. 7).

Pre-service teachers’ shifting emphasis from the lingering basic to the new basics signifies their awareness of the needs of students to manage the rapidly changing literacy practices of the fast capitalist era. An unquestioning willingness and ability to adapt to the rapidly changing values and perspectives of the marketplace, however, promotes consumerism by encouraging an increased demand for newness and novelty. One pre-service teacher accommodates the fast capitalist worldview by relating the need for speed to the need for speeding up educational processes through: *Time saving by using the computer to replace laborious grappling.* In this context it can be argued that ICT encourages critical thinking by taking over and speeding up the encoding and decoding processes.

Manipulating texts more efficiency through ICT use, however, does not necessarily indicate or require higher comprehension levels. Stoll (1995) raises the question, “if a child doesn’t have a questioning mind, what good does all this networked technology do?” (p. 132). The development of critical literacy skills in this context is important for ensuring that social goals remain open and do not become a form of ideological propaganda such as that which maintains the dominance of multinational corporations, whose interests are served through the promotion of fast capitalist mindsets. Without the critical literacy skills represented by the new basics, free inquiry represents a circular

process within which the individual is trapped. There is no point in promoting greater individual freedom for example, if there is no description of what a freer society might look like and if the parameters of all inquiry are set by the language of a culture for the benefit of those in power.

5.6.4.3 Elite and foreign language literacies

The elite literacies signify the specialist language practices that constitute key learning areas within the curriculum. Pre-service teachers refer to elite and foreign language literacies when they demonstrate concern for the development of students' literacy proficiencies within key learning areas: *Students gain computer skills yet neglect the focus of the lesson; IT class is a gateway for well implementing PCs into other curriculum or it will be very much time consumed and hardly to achieve the aim we are expecting.*

Foreign language literacy also operates as an elite literacy when it is framed within an educational discourse that constructs foreign language learning in terms of another discrete set of literacy skills within an English speaking community. The irony of this position lies in pre-service teachers' support for ICT discourses that construct the internet as a globally networked online community while concurrently neglecting issues related to the decreasing number of foreign language literacies offered at university level, from 66 languages in 1997, to 29 languages in 2007 (Group of Eight, 2007). While pre-service teachers support the concept of a globally networked community, they leave unchallenged the monolingual mindset, which dominates the global network through the colonising regime of the English language. While any pedagogy involves socialising and enculturating students (Morgan, 2001), a monolingual mindset is a limiting factor for those operating within a global or multicultural context that requires an ability to communicate across non-English literacy frameworks:

The dominance of English on the Internet is also decreasing. The proportion of Internet users with English as a native language has declined from 51.3 percent in 2000 to 32 per cent in 2005 and the proportion of English material on the Internet has also declined. (Group of Eight, 2006, p. 5)

Nevertheless, acknowledging and building upon the existing linguistic skills of the sixteen percent of Australians who speak a language other than English (Clyne, 2005) will continue to be resisted while literacy and English are constructed as synonymous concepts:

The classroom is already a policy site; every time teachers insist on a uniform variety of language or discourse, we are helping reproduce monolingualist ideologies and linguistic hierarchies. (Canagarajah, 2006, p. 587)

The language or medium in which we communicate changes how thoughts are organised (Stoll, 1995). In German, for example, everything has a gender. In Japanese, the subject is often indeterminate, and in cybernetic discourses there are no bodies, only information systems. Lankshear's (2006) literacy framework highlights how pre-service teachers' engagement with ICT literacy debates can become polarised in terms of those who possess the new or lingering basics and those who do not, with the result that little attention is paid to how such debates determine whose language practices, subjectivities and cultures are at stake. In this respect, focusing only on the haves and have nots of ICT literacy alone cannot lead to significant gains in terms of accessing a rich diversity of alternative language frameworks and communicative practices.

5.7 Conclusion

This chapter has made visible and examined the discursive strategies and techniques of four dominant discourses that inform pre-service teachers' understandings of the role of ICT in education. The discourse of progressive bodies maintains hegemonic relations by foregrounding the potential and productivity of the normative body in cyberspace. The discourse of posthuman pedagogy, determines teacher efficacy based on the ability to promote closer human-machine relationships through the increased use of ICT. The discourse of interactivity conflates human dialogue with machine data flows and leaves unexamined the qualitative difference between knowledge and information. Finally, the discourse of literacy fragments and reduces literacy practices to enable the individual to work effectively within and across highly regulated, technologised systems. The implications of pre-service teachers drawing from these discourses to legitimise their developing teacher subjectivities and classroom practices will be discussed in the following chapter.

Conclusion: The discourse of changing education

6.1 Introduction

Chapter six re-engages with the research question that asks how pre-service teachers understand the role of ICT in education. It draws together the research strands by re-examining all significant findings in terms of the aims and purposes of the research.

Section 6.2 of this chapter reviews the research process. It begins with a re-examination of the research aims and purposes, followed by an outline of the literature and methodology chapters, which support the findings. This follows with a summary of four discourses constructed as a result of data analysis. The techniques and strategies of the four discourses are then woven together to construct a fifth discourse, the discourse of changing education, which articulates the implications of pre-service teachers' understandings of the role of ICT in education for pedagogic relations. Finally, recommendations are made in view of these findings.

6.2 Review of the research

6.2.1 Framing the question

This research investigates how pre-service teachers understand the role of ICT in education. It does not aim to identify a truth about the subjects and objects under investigation, but aims, instead, to make visible the mechanisms which bring these objects into being and into relationship with each other.

The research approach is supported and informed by feminist poststructuralist theory (Weedon, 1987), which problematises positivist, instrumentalist and determinist approaches to researching ICT in education. This thesis argues that positivist research paradigms bring to attention and address only a limited range of issues. The intention of the researcher, in taking up a feminist poststructuralist position to educational research, is not to alienate those who operate within positivist research frameworks, or to undermine the importance of their contributions, but to add an extra dimension to conversations about

educational research, and to offer, not a alternative, but an additional perspective to the knowledges developing at the intersection of education, ICT, literacy and pedagogy.

Furthermore, this research aims to contribute to theories about the relationship between language, literacy, technology and education, by relating the micro context of pre-service teachers' knowledges about ICT and education to the macro context of broader cultural discourses that inform ICT practices. Explicating the knowledge frameworks and language practices pre-service teachers draw on to articulate their understandings of role of ICT in education, and examining the development of subjectivities and pedagogies at the intersection of a range of often contesting discourses, is undertaken to make visible the gaps, contradictions and tensions between theory and practice.

The purpose of this research is to elucidate the moral and political implications of pre-service teachers' understandings of ICT in education. To this end, three questions have guided the research process:

- How do pre-service teachers practice and understand technology?
- Towards what ends and means is ICT practiced?
- Who participates in ICT use and why or why not?

Dominant rationalities have been problematised by identifying gaps, contradictions and tensions in dominant discourses, thereby challenging current regimes of truth that maintain unfair systems by privileging normative discourses that promote a homogeneous worldview. Breaking up homogenising educational systems through critical literacy practices promotes an understanding of social change, not as a natural and inevitable condition to which the individual is forced to adapt, but as an opportunity for social design and an effect of transformative pedagogies.

Heffron (1995) confirms that, "What counts *is* the system and the range and variety of human activity it can incorporate" (p. 504). In this respect, the research also serves the purpose of increasing the range of subjectivities available within educational systems by constructing, acknowledging and validating different ways of being and knowing with and through new technologies.

6.2.2 A review of the literature

6.2.2.1 Epistemic practices: Literacy, technology, subjectivity and pedagogy

Three aspects of the literature, relating to epistemological, ontological and teleological issues have been discussed in this thesis. It has been argued that language is a social technology that constructs and informs a culture by establishing rationalities, or discursive regimes of truth, that influence how nature, knowledge and human progress are constructed, communicated and experienced. New literacies have been problematised as social technologies that construct subjectivities within relationships of advantage and disadvantage by regulating meaning making practices and privileging some ways of knowing and being over others. Intelligence, therefore, a key concept in pre-service teachers' pedagogic discourses, has been discussed in this thesis as being a cultural effect of institutionalised, literacy discourses, rather than a latent state requiring pedagogic intervention.

6.2.2.2 Ontology: The unfinished body

As subjectivity, identity and knowledge are the work of pedagogical relationships (Luke & Gore, 1992) the thesis has engaged with the literature that interrogates the body as the site of power/relations. Grosz (1994) and Butler (1990) argue that the body, which is produced by and only knowable within discourse, must be interrogated as an unfinished cultural production. Examining how language operates systematically to both enable and delimit pre-service teachers' understandings of the role of ICT in education, therefore, also makes visible the ways in which "discourses of power form, maintain, sustain and regulate the human body, ie, how they constitute its very *materialization*" (McWilliam & Taylor, 1996).

Ontological arguments demonstrate the unfinished nature of being and explain the power of cyborg metaphor for promoting disembodied subjectivities, thereby disconnecting discourses from the sites which give them meaning. This is similar to disconnecting theory from practice. Feminist poststructuralist theory (Weedon, 1987) argues the importance of acknowledging uniquely located corporealities as the sites of inscription to ensure that pedagogues "reject any essentialist ontology of the body" (McWilliam & Taylor, 1996, p. 19). The literature reviewed in this thesis has provided a genealogy of the body as it is constructed within the discourses of science. Genealogy examines, and

provides evidence of, shifting constructions of the body. Furthermore, a discussion of the relationship between the normative body of hegemonic discourses, and the corporealities of uniquely located subjectivities, identifies gaps, silences and tension as potential spaces for agency through the production of new bodies of discourse and supports the development of critical and transformative pedagogies.

The study of the power/knowledge relationships produced by pre-service teachers as they discuss ICT practices in education is based on the understanding that the world is not a fixed reality to which one must adapt. Concepts of space and time can be contested. There are no innocent or natural origins. The body is both the site of power and the object of power relations. Knowledge is contingent and principally contestable. When corporealities are erased from a discourse, however, these perspectives are lost from view. The literature review seeks to re-establish the link between the body as a site of power relations, literacy as a means of controlling knowledge practices, and technology as symbolic of human progress. The thesis discusses how mutually constitutive relationships between normative discourses and embodied discourses, inscription and incorporation, undermine simple dichotomies by positing instead, concurrently incommensurable and inseparable realities to expose a paradox of the human condition, explaining at the same time, the contradictory politics of literacy debates as representing a shifting position between normative discourses and situated discourses, between theory and practice, between the abstract and the particular.

6.2.2.3 Human progress: The technologisation of education for cyborg futures

The significance of the contradictory politics of contemporary literacy debates is its articulation of the mutually constitutive relationship between ontology and epistemology: between subjectivities and representational practices, between identity and literacy. Discourses that construct the normative body also construct literacy as a unifying technology, representing social homogeneity and progress. The technologisation of education is demonstrated by a one-size-fits-all curriculum and the implementation of standardised testing. Underlying this discourse, and paradoxically complicit with it, are a multitude of situated, corporeal perspectives, resulting in the fragmentation of literacy to a number of discrete sets of skills such as spelling, keyboarding, writing, cutting and pasting. Relating and regulating specific and fragmented skills to fit the jigsaw of a national literacy program is a promethean task when considering the increasingly complex and

constantly changing, expanding and contracting, global and local shape of the techno-cultural landscape. Teachers are given the responsibility of completing this puzzle.

Knowledge is both enabled and constrained by the power relations established by the tensions produced by normative and situated discourses. Haraway (1991) articulates this conundrum when she writes: “the only way to find a larger vision is to be somewhere in particular” (p. 196). Mutually constitutive binaries explain not only the contradictory politics of literacy, but also produce a number of paradoxes. When embodiment is erased from a discourse, then certain arguments and alternatives are lost from view. Key binaries constructed around the cyborg metaphor and problematised by the literature, include: biological/technological, human/machine, embodied/disembodied, self/other, male/female, active/passive, liberation/regulation, global/local, interactive/solitary and productive/reductive.

A teleology of homogeneity and regulation in the name of equity and inclusion has the paradoxical effect of marginalising sections of the population by categorising them in terms of deficiency and difference. The literature review, therefore, foregrounds the need to question the neutrality of any pedagogic process, to understand how institutions regulate knowledge production, identify the power effects and to ask who benefits from this discursive arrangement, by drawing attention to marginalised discourses. While ICT discourse is part of a broader socio-cultural landscape, there is also a need to understand the construction of teaching and learning subjectivities in the micro context of classrooms in order to identify possibilities for social design through transformative pedagogies.

Furthermore, ideologies are read into the data, (Rogers et al., 2005) and academic genres privilege some voices over others. There is always the danger of “naturalizing those tendencies we endorse” (Tamboukou & Ball, 2003, p. 28) and the researcher acknowledges the political nature of language as a key problematic. As Burbules and Bruce (2001) write, “the full meaning and effects of discourse will be impossible to read off the surface meanings of the words themselves” (p. 1103). Consequently relations between teacher and student, researcher and teacher, lecturer and pre-service teacher are not limited solely to the things they say when they are teaching.

Important voices not represented in the analysis include those of students. Although pre-service teachers can, to some degree, relate to student experiences as they are themselves still students, what pre-service teachers describe as their teaching pedagogy may not be an accurate reflection of what they actually do in the classroom. Another limiting factor of the research's design and inquiry processes is that of the researcher's own location within discourses.

6.2.3 Review of the methodology

This research is informed by feminist poststructuralist theories, which argue that access to social realities is only possible through language (Phillips & Jorgensen, 2002; Weedon, 1987). Lee, (1992) writes that "poststructuralist work is explicitly about the refusal of singularity and unit, of universality and transcendence, of foundational principles and of particular dominant notions of rationality" (para. 30). Discourses are loosely defined and interrelated sets of language practices (Phillips & Jorgensen, 2002), which are unavoidably political as they construct power/knowledge relationships. Feminist poststructuralist theory (Weedon, 1987) foregrounds the need to acknowledge how such power/knowledge relationships are constructed in the micro context of individual subjectivities and the macro context of socio-cultural histories. These theories inform the research process by directing the researcher to a methodology which enables the examination of the relationships between partial, perspectival knowledges, and dominant rationalities. A qualitative, mixed methods approach incorporating Foucauldian critical discourse analysis (Carabine, 2001) and constructivist grounded theory (Charmaz, 2000, 2006) examines how language operates systematically at the intersection of ICT and educational discourses, to not only construct pre-service teachers' understandings of the role of ICT in education, but also to delimit and regulate what pre-service teachers can acknowledge and communicate as true.

The explication of discursive relationships, techniques and strategies has been facilitated and made more transparent by a mixed methods approach in which constructivist grounded theory processes whereby codes and categories are examined and their relationships established. Carabine's (2001) Foucauldian critical discourse analytic framework, has been used to interrogate the categories in terms of the discursive techniques and strategies of particular rationalities, or epistemic practices, which inform pre-service teachers' understandings of the role of ICT in education.

The analytical process of moving from open coding to axial coding to categories to discourses demonstrates the nature of any discourse as more than the sum of its parts. Dey (1999) explains, “there are processes that we can only understand if we recognise the forest as a forest and refuse to analyse it in terms of individual trees ... the ecology of the forest is not the sum of the ecology of each individual tree” (p. 100). The genealogical deconstruction of the body examined in the literature review, therefore, foregrounds the historical locatedness and shifting complexity of discourses, literacies and subjectivities.

6.2.4 Review of the research limitations

The limitations of the research have been discussed in detail in the methodology chapter. Key issues for consideration include: the difficulty of defining the boundaries of categories and discourses; the lack of clear cut-off points for data collection; the reading of unarticulated theories into the data; the researcher’s voice; the inevitably partial and provisional nature of the researcher’s account; and the complexity of discursive configurations that inform the language practices of the research participants.

Furthermore, feminist poststructuralist theory (Weedon, 1987) brings to the analytical process its own discursive regimes, which inform the significance of the findings. A regime is an established system of organisation, which seeks to set up and maintain its boundaries in order to define itself and leave incommensurable realities on the outside, thereby enabling greater autonomy and control over the parts that make up the whole. Consequently, discourses represent self-perpetuating realities through the a normalisation of a system to the point where events only have meaning as they correspond to, or deviate from, the patterns established by the discourse. A discursive regime, such as the feminist poststructuralist theory (Weedon, 1987) that informs this study, weaves together, justifies and explains the presence of other discourses such as those of qualitative methodologies, social constructivist theory, grounded theory and critical discourse analysis.

6.3 Findings: The discourse of changing education

Tomorrow's students differ greatly and cannot be taught the same way as yesterday, they seem prepared to take the next steps required in the evolution of teaching.

It's what they relate to, it's the technological age.

Computer savvy students of a post MTV generation have different learning styles and requirements that requires teachers to keep up and look forward to a future full of integrated circuits.

(excerpts taken from pre-service teachers' texts)

The discourse of changing education is the last of the five discourses produced through analysis of the research data. In constituting the concluding section, the discourse of changing education is not assigned any greater or lesser importance than the other four discourses, but serves the purpose of re-examining how all the discourses work together to inform not only pre-service teachers' understandings of the role of ICT in education, but also the means and ends of education. Intentionally or unintentionally, pre-service teachers, in discussing the role of ICT in education, also construct ways of thinking about the aims and purposes of education in the digital age.

6.3.1 The discourse of progressive bodies

The first discourse, the discourse of progressive bodies, promotes an increased dependency upon new technologies. The discourse of progressive bodies maintains hegemonic relations by foregrounding the potential and productivity of the normative body in cyberspace. Cyborg metaphors promote the future intensification of symbiotic human-machine relationships and maintains the current hegemonic order by perpetuating normative discourses that make the body less visible as the site for the construction of subjectivities and power relationships. The potential of cyborg bodies is established through the dissemination of ICT discourses, replete with positive terms such as: integrative, inclusive, freedom, novelty, innovation, speed, efficiency, productivity, creativity, engagement, and new spaces. The erasure of corporealities through the use of ICT discourses that construct the disembodied space of electronic networks, however, has had the effect of producing a number of marginalised and subjugated voices that articulate the paradoxical conditions for participation in cyberspace.

6.3.2 The discourse of posthuman pedagogy

The discourse of posthuman pedagogy conflates knowledge with information and constructs the progressive and competent teacher as one who is capable of promoting the discourse of progressive bodies. An efficacious pedagogy advances the vision of cyborg futures by facilitating and encouraging students' connection to and with new technologies and technologised others. A symbiotic relationship with technological entities offers a means by which the deficient body can be improved by the more efficient technology. The marginalisation of corporeality means that knowledge, like information, can be disconnected from social, cultural, historical and political contexts. When knowledge is disassociated from its origins it has no intrinsic meaning outside of its value as a product to be packaged, transmitted and consumed. In this respect, the discourse of posthuman pedagogy makes visible the discursive techniques and strategies that constrain the development of critical and transformative pedagogies, and support efforts to further discipline and rationalise pedagogic processes through the technologisation of education.

Furthermore, while pre-service teachers accede to, and reproduce the powerful discourse of progressive bodies, the discourse of posthuman pedagogy demonstrates how pre-service teachers struggle to do so in ways that are gender appropriate and cohere with contemporary theories of education. Pre-service teachers interpret their own pedagogies in terms of accessibility, inclusion and social constructivism while describing their observations of ICT use in behaviourist terms.

6.3.3 The discourse of interactivity

The discourse of interactivity works with the discourse of posthuman pedagogy by conflating human dialogue with machine data flows, and leaving unexamined the qualitative difference between knowledge and information, and human and machine interaction. The discourse of interactivity promotes a form of participation and inclusion that de-emphasises political involvement and ethics. It matters little what one is involved in: simply pushing a button and responding to a program means that one is interactive and, therefore, included. If interacting with a program is same as interacting with a person then it is possible to argue that ICT, rather than the teacher, facilitates constructivist pedagogies and authentic classroom practices and promotes cooperation and collaboration across learning communities.

The discourse of interactivity encourages ICT centered classrooms in which the student and the teacher are constructed as passive and isolated elements: information patterns awaiting inclusion and interaction through machine processes. This position is a reversal of ontological values as cyberspace is constructed as more authentic than corporealities. Consequently, as cyberspace is the product of normative discourses, which make invisible the role corporealities play in disrupting and contesting established norms and oppressive realities, powerful stereotypes and hegemonic dichotomies, such as technological/biological, and male/female, are paradoxically reinforced.

6.3.4 The discourse of literacy

The discourse of literacy fragments and reduces literacy practices to construct an understanding of intelligence as the ability to work effectively across highly regulated, technologised systems. ICT is understood as scaffolding and supporting students' lower order thinking, thereby leaving the student free to work independently and focus on higher order thinking. The separation of higher and lower order thinking skills paradoxically encourages the independent learner's increased dependence on ICT for basic literacy skills. A further paradox produced by the higher order thinking/lower order thinking binary, is the reduced complexity of learners' dialogic interactions in digital domains, while at the same time, new technologies require the learner to engage with and operate effectively within a range of complex and rapidly shifting configurations of textual practices and social relationships. The contradictory politics of literacy debates are, therefore, the result of the bifurcation of thinking processes. What constitutes ICT literacy remains a complex and contested focus of pre-service teachers' expanding and contracting literacy frameworks.

New ICT practices in education are more than just about pre-service teacher pedagogy and student learning but also about the re-configuration and regulation of power relations in the name of literacy. Digital computer metaphors taken up by cognitivists, for example, encourage pre-service teachers to emphasise fact and logic over social and cultural effect, thereby making invisible the oppressive effects hegemonic discourses have on marginalised corporealities.

6.4 Implications

Government policy promotes the view that the primary, if not the only, goal of human labor and thought is efficiency; that technical calculation is in all respects superior to human; that in fact human judgment can not be trusted, because it is plagued by laxity, ambiguity, and unnecessary complexity; that subjectivity is an obstacle to clear thinking; that what cannot be measured either does not exist or is of no value. And that the affairs of citizens are best guided and conducted by experts ultimately teachers will be relieved of any responsibility to think at all. (Postman, 1992, p. 51)

6.4.1 Literacy as the interface

Literacy remains an abiding concern of the curriculum as it represents the regulation, organisation and transmission of texts. The findings of the research problematise pre-service teachers' construction of literacy as a fixed and neutral interface between the self and the world by explicating the discursive techniques and strategies that construct relationships of domination and control. The literature reviewed in this research, and the discourses of pre-service teachers, acknowledge how the individual's experience of the world is increasingly mediated by the products of scientific discourses such as genetic manipulation, robotics, drugs, hearing implants, prostheses and plastic surgery, so that what it means to be human, and what it means to be intelligent, is increasingly informed by new technologies.

Pre-service teachers' use of the term literacy is shifting to become increasingly self-referential. The aim of inquiry and problem solving is to produce, relay and store more information more efficiently and accurately. Using this circular argument justifies the claim that ICT literacy is an educational imperative. What is important in this model of communication is the accurate flow of information. It leaves out of the loop the significance of corporealities as sites at which information is given context and meaning and is transformed into new perspectives and knowledges.

The significance of the contradictory politics of contemporary literacy debates is most clearly demonstrated through standardised testing. The authorisation of particular, standardised and regulated literacy practices marginalises other forms of literacy, aims to identify students' deficiencies, and shapes how the perceived problem is dealt with. This critique does not suggest that all aspects and forms of literacy practices are equally

empowering or disempowering, but argues that there is not one universally valid interpretation of literacy. There are multiple and contested forms of literacy practice operating within any school community. The rhetoric of equal opportunity and meritocracy surrounding education, therefore, paradoxically serves to legitimate the patterned inequalities within society (Lankshear & Lawler, 1987), and renders meaning making practices and subjectivities governable.

6.4.2 Educating the posthuman

Posthuman discourses are creeping into educational contexts. Use of cyborg metaphors encourage a view of the body as deficient, or a least highly problematic, because, as a site for the construction of subjectivity and meaning making, corporealities reinterpret or, from a posthuman perspective, distort information. Discursive gaps, tensions and contradictions represent the effects of uniquely located corporealities, which are both enabled and constrained by complex discursive configurations.

The deficiency of bodies is minimised by interfacing learners directly with computers and articulating teachers' work in managerial terms. The term interface is drawn from ICT discourses and used here to problematise the boundary between human and machine, and between biology and technology. The minimalisation of resistance against those in positions of power is possible because, while students are learning how to program computers, computers are conditioning students to decode and encode data in highly regulated ways.

The posthuman worldview constructed by computer discourses promotes a shift in human social conditions and consciousness which has profound implications for education. If minimising teacher interference, for example, means improving the flow of the information, then the future of education can reasonably be constructed as "technologically based learning environments and a paradigm of learning rather than teaching" (Hamilton et al., 2004, p. 844). Informed by a paradigm of learning, the leaky interface of teachers' bodies that interfere with the smooth and accurate transmission of information can be replaced with computers that are "seen as prostheses" (Hamilton et al., 2004, p. 844) as they connect students directly to information sources and "deliver fast knowledge" (Hamilton et al., 2004, p. 844).

A report issued in 1998 by the Australian Federal Government outlines an educational plan for the information economy and promotes five key goals “which focus on technology and the economy, while the social responsibilities and cultural dimensions of schooling and education are, in large part, overlooked” (Kapitzke, 2003, p. 42). Kapitzke (2003) problematises the government’s educational priorities, explaining that the concept of information literacy originates from the industrial sector and “privileges the role of information in learning and teaching” (p. 50). Reconceptualising education as a sector of the information economy explains how it is possible to shift definitions of intelligence and knowledge to accommodate the interests of the corporate world and promote new ways of thinking and working. Consequently, government programs for the resourcing of schools, tend to overlook the importance of student-teacher relationships.

The “re-sciencing” of learning and education in the “context of human/machinic convergence” (McWilliam & Lee, 2006, p. 57) points to the growing influence of computer metaphors for developing new theories of learning (Renshaw, 2003). Computer discourses promote a theory of learning based on the information processing principles of cybernetics, which is the science of communications and automatic control systems in both machines and living things. These principles construct knowledge as a transfer of information, thereby supporting a return to the banking concept of education (Freire, 1970) and undermining social and critical constructivist pedagogies by obscuring the significance of the body as the orienting context of and for meaning-making.

Recently, the *Oxford English Dictionary* (Moore, 2004) has declared that it has reached a new milestone: the corpus now has one billion words of “real 21st century English” (Oxford Online, 2006). Sixty-two new words in the latest edition of the *Oxford English Dictionary* (Moore, 2004) include: e-commerce, dot.com and webcam. New digital technologies, new words, and old words used in new ways, such as mouse, port, web and interface, all provide new metaphors for representing, ordering and understanding the world. Similarly, the human-machine metaphor allows educators to talk about programing behaviours and hard wiring information in students. Words that once signified uniquely human phenomena, such as intelligence and language, are now being used to describe the potential of computers.

Furthermore, the separation of knowledge into discrete and often arbitrarily defined fields encourages the fragmentation of inquiry so that the development of specialised knowledges can be seen as autonomous of other fields of knowledge such as ethics and politics (Lankshear & Lawler, 1987). These shifts in meaning, resulting from the discursive blurring of boundaries between human and machine processes, are promoted by ICT discourses, which promote a dangerous reductionism in the way teachers talk about and understand teaching and learning in the digital age.

Contemporary education is currently embedded in a discursive framework that represents a “management push towards valuing competencies over knowledge” (Collins, 2004, p. 228) and a one-size-fits-all approach to best practice. Such an approach to ICT in education de-professionalises teaching by constructing it as “a craft which can be pinned down to a list of competencies” (Collins, 2004, p. 230) instead of a uniquely contextualised process that aims to establish the most inclusive and appropriate knowledge base for particular teaching and learning communities. This is particularly problematic for teachers in fast capitalist societies, who work not only with, but also against, overwhelming amounts of information. Teachers need to be able to operate with a high level of autonomy because pedagogical flexibility is necessary for dealing effectively and ethically with new information sources and communication practices, shifting student populations, and individuals from increasingly diverse cultural backgrounds.

6.4.3 The paradox of agency: Living with ambiguity

The concept of freedom and the possibility of social transformation are contingent upon the positioning of individuals in complex and multiple ways within a range of competing and contradictory discourses. Foucault (1970) engages with the contradictory complexity of discursive frameworks by theorising the play of oppositions in terms of discontinuity and continuity. These concepts have been discussed in this thesis in terms of embodied and normative discourses, and expanding and contracting literacies. Foucault (1970) explains continuity as: the emergence of the norm above the level of functional fluctuations; the permanence of function and the interconnection of conflicts, which constitute the fabric of signification. Discontinuity is defined as the need for the internal coherence of signifying systems, the specificity of bodies of rules and the decisive character they assume in relation to what must be regulated. Corporealities and individual

subjectivities, therefore, represent discontinuity, while dominant discourses represent the workings of continuity above the level of corporeal fluctuations.

As “initial points of structural intelligibility” (Lee, 1992, para. 20), binary structures are dangerously reductive and yet, as Grosz (2005) points out, “we could not function within this teaming multiplicity without some ability to skeletalize it, to diagram or simplify it. Yet this reduction occurs only at a cost ... these activities of recomposition lose something in the process.” (p. 141). Binary structures construct values and maintain hegemonic structures of domination and conceal alternative possibilities. They are, however, also productive as “concepts achieve identity only in their difference from one another” (Lee, 1992, para. 34).

Just as the contradictory complexity of the discourse of literacy draws attention to the play of oppositions, the discourse of changing education makes visible the many paradoxes brought to light through pre-service teachers’ articulations of theory/practice relationships. Similarly, the rhetoric of equal opportunity and meritocracy surrounding education serves to legitimate the patterned inequalities within society (Lankshear & Lawler, 1987) and re-victimise those it claims to be trying to help.

6.4.4 Critical pedagogy: Locating agency

We have a triple constriction of the means of communication: the elimination of the less profitable means in favor of the more profitable; the fact that these means are in the hands of the very limited class of wealthy men, and thus naturally express the opinions of that class; and the further fact that, as one of the chief avenues to political and personal power, they attract above all those ambitious for such power. (Wiener, 1961, p. 161)

ICT use is not inherently good or bad, but it is important for educators to understand the potential effects of learning programs that promote behaviourist discourses in education. It is also important for teacher educators to involve pre-service across curricular areas to analyse programs for their assumptions about literacy, to critique them for their possible consequences for their range of students, and to identify strategies for correcting any practices that undermine teacher and learner agency (Morgan, 2001).

Although the explicit teaching of ICT is important, a crowded curriculum makes it difficult for the teacher to decide how much time should be put aside to develop their

students' ICT skills and critical thinking skills. ICT use brings with it new genres, new icons, a new vocabulary, and requires additional skills such as typing and research skills. ICT literacy does not replace previous literacy skills but emphasises, instead, the need for critical pedagogies that can critically locate and relate changing literacy practices as part of an ongoing cultural project.

English has become the lingua franca of the movement towards globalisation. There are many forms of English. Privileging one form paradoxically provides a more inclusive arena for individuals whose first language is not English, while at the same time marginalising those forms of English that contest traditions of English language conventions. A wide variety of Englishes are now embedding in the collective imagination. Thus any effort to displace these new Englishes must be perceived as an ongoing colonial project.

Critical pedagogies critique the tendency of the sciences to develop such a degree of specialisation that the expert is often illiterate outside his own minute speciality (Wiener, 1961). Consequently, Gerver (1986) explains that while many of the words used in the world of computing such as mice, fields, bugs, trees, boot, memory, string and apple, sound friendly, the world of computing is often made inaccessible by forbidding barricades of non-communication:

Like any technology, computing requires a specialized use of language.... But the tangle of acronyms, slang, and technical jargon with which their use tends to be surrounded has too often made adults feel, unjustifiably that difficulties in use result from their own failure to understand rather than from the failure of the computer specialists to communicate effectively. (Gerver, 1986, pp. 17-19)

Behaviourism, nevertheless, aims to habituate the individual to new ICT literacies by habituating bodies to the computer interface. If learners use ICTs routinely, ritualistically, and inattentively, then metaphorically they can be seen to be acting like machines. For the posthuman, this is not problematic, as this enables the individual to operate effectively, productively and efficiently within a technologised workplace. Posthuman discourses (Millar, 2000) depend on:

our believing that we are at our best when acting like machines, and that in significant ways machines may be trusted to act as our surrogate. Among the implications of these beliefs is a loss of

confidence in human judgment and subjectivity. (Postman, 1992, p. 118)

Without critical thinking skills, the multimodal capacities of ICT can represent a seductive form of behavioural conditioning. New visual literacy modes that promote the use of icons, fonts, colour, and abbreviated writing styles encourage the user to wonder at the effects and productivity the machines to the point where the individual is “encouraged to ignore the ideas embedded in them which means we become blind to the ideological meaning of our technologies” (Postman, 1992, p. 94).

6.5 Recommendations

The discourse of changing education draws together a range of discursive techniques and strategies and demonstrates how understandings of educational practice and purposes can be reformed by new technologies. The researcher’s examination of these discourses is informed as much by textual omissions as by the categories selected for analysis. For this reason, many lines of inquiry remain unexamined in this thesis, and many have been developed to an arbitrary point, which has been determined by such constraints as time and thesis length. This section addresses these issues to some degree by acknowledging the need for further research in a range of areas only touched upon briefly by the researcher.

As the researcher considers an understanding of a range of educational theories and their social, cultural and political effects to be paramount for developing ethically informed pedagogies, the first recommendation is to support the teaching of educational philosophy in pre-service teacher programs. Pre-service teachers need to develop a critical stance towards claims of a single rationality and objective truth. Although not always articulated, theory is always implicated in the practice of education. Teachers educate students for a purpose, that is, a perceived future. The educational discourses examined in this thesis suggest pedagogic developments are more powerfully informed by managerial demands and fast capitalist discourses, than through dialogic processes which negotiate issues of social justice. Hodas (2006) argues that “schools themselves are a technology ... a way of knowing applied to a specific goal ... for preserving and transmitting information and authority, for inculcating certain values and practices while minimizing or eliminating others” (p. 197).

As parents, educational administrators, politicians and business organisations have conflicting expectations of educational processes and outcomes, their voices require representation in educational research, thereby enabling pre-service teachers and pre-service teacher educators to engage with and understand the broader cultural visions within which their practice is located. At the same time, however, pre-service teachers need to be aware of the ethical, social and political functions of those dominant discourses to avoid perpetuating the myth of the neutrality of educational practices.

The development of critical thinking also needs further examination in graduate teacher programs. As this research has demonstrated, pre-service teachers' reflective practices can simply reflect a dominant view of education and reaffirm established concepts and theories rather than attend to the possibility of an alternative, more equitable knowledge base for pedagogic encounters. This concern has already been articulated by Collins (2004), who argues the importance of educational theory for pre-service teacher education:

teachers can only think through the lenses provided by the language and ideas to which they have been introduced.... No one can see that in which they are simply immersed.... What students need is a variety of lenses through which practice might be examined, justified and/or changed. (para. 22-27)

Pre-service teachers need to be aware of the tensions and contradictions in their own pedagogic discourses. They must be able to articulate how they are located within a range of unstable and shifting discourses, and consider how their position can contribute to the development of oppressive or transformative classroom practices. Pre-service teacher coursework needs to not only include the development of an operational ICT skills base but should also aim to incorporate and develop critical theories of technology, explicitly linking practice back to pedagogy.

The work of feminist poststructuralist research (Lee, 1992) contributes to the development of critical pedagogies through its emphasis on micro contexts, histories of the body and marginalised perspectives, thereby revealing the political content of what has otherwise been presented in positivist research frameworks as apolitical. For this reason, the research recommends the continued mapping of the body in a range of educational contexts, as this informs the construction of teaching and learning subjectivities and the coherence of pedagogic frameworks. Genealogical and feminist research frameworks

(Carabine, 2002; Lee, 1992) acknowledge embodiment to be the site upon which discursive processes operate, and renders social, cultural and political realities contingent and contestable. Genealogical research is, therefore, important for recording changes in the configuration of knowledge/power relationships as they are constructed around bodies, and demonstrated through a range of pedagogic practices. In addition, critical pedagogies, informed by feminist poststructuralist research (Lee, 1992), can empower teachers and students to transform classroom practice and design social futures by opening up and acknowledging new spaces for new ways of being and knowing.

Linking theory to practice is important for feminist poststructuralist work and Haraway's (1991) argument that "the only way to find a larger vision is to be somewhere in particular" (p. 196) articulates the inescapable irony of critical pedagogies, which acknowledge the need to be somewhere in particular and take up a position in order to act in classroom contexts, while at the same time questioning and problematising the limitations of those practices and the position they represent. Another recommendation of this research, therefore, is to conduct feminist poststructuralist research (Lee, 1992) in a range of subject areas to examine and identify the micro contexts, which enable or disable critical pedagogies. Do all students have an equal voice on line? What are the markers of difference in cyberspace, and which binary constructions dominate to inform these differences?

While the male/female binary has been the object of much educational research, the human/machine binary remains the focus of critique for the writers of science fiction rather than for educational research. Other conceptual relationships problematised by this research include: authentic and non-authentic, independent and dependent, constructivist and behaviourist, interactive and solitary, freedom and control. These binaries require further investigation. This research also recommends that further research is required to establish a range of critical theories of technology to examine how machine metaphors can operate productively to facilitate different visions of pedagogy and human progress, while also reinforcing oppressive educational traditions by establishing teachers as transmitters and students as receivers of information. Educational emphasis on ICT literacies and global futures are a concern for Torres (2005), who argues that the banking model of education has left the classroom and has expanded to a global scale.

A critical theory of technology needs to consider who benefits from the solutions offered by ICT in education, and support critical pedagogies that aim to promote proactive social design and politically transparent classroom practices with ICT. Educational research needs to relate pedagogy to the politics of citizenship. What counts is not the solidity or certainty of the pedagogic discourses, but the range of subjectivities pedagogies can acknowledge and bring into dialogue with one another. Reductive thinking and homogeneous realities must be contested through critical pedagogies that resist simple answers, seek to uncover what has been concealed, and remember what has been lost.

6.6 Conclusion

This research has examined how pre-service teachers concurrently construct and draw on dominant discourses to legitimise their teacher identities and classroom practices with ICT. The research findings explicate the ways in which pre-service teachers construct a range of pedagogic perspectives on ICT practices in education. Partial and perspectival readings of pre-service teachers' pedagogies demonstrate how feminist poststructuralist research can problematise and resist singularity and unit, universality and transcendence, foundational principles and particular dominant notions of rationality (Lee, 1992). This research has examined how subjects and objects come into being and into relationship with one another and has made visible and discussed the tensions and inconsistencies that signify contesting ontological and epistemological frameworks.

This research has also demonstrated how pre-service teachers concurrently construct and draw on dominant discourses to legitimise their teacher identities and classroom practices. The research findings explicate the ways in which pre-service teachers construct a range of pedagogic perspectives on ICT practices in education. At the same time, pre-service teachers' textual renderings of new bodies, spaces, potentials, pedagogies and social relationships have articulated both privileged and marginalised teacher identities.

The findings of the research have made visible the discursive mechanisms by which the values and perspectives afforded as a result of the epistemic practices round ICT have been taken up and promoted within education. The findings demonstrate how new technologies and new metaphors can effect a redistribution and reconfiguration of educational discourses. To accept any semiotic system as a transparent medium for representing the world is to diminish the possibility of authorising new teaching and

learning subjectivities in the classroom. Feminist poststructuralist research (Lee, 1992), however, can empower teacher-researchers to challenge oppressive discourses and envision alternative social futures. For this reason feminist poststructuralist research (Lee, 1992) is a powerful political tool with which dominant concepts such as nature, knowledge and human progress can be contested and reshaped.

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