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Internet Realities: ‘Amazing But Time Consuming’?

A Case Study of Student Teachers’ Interpretations of the Internet

**Robyn Smits
1997**

A thesis presented in partial fulfilment of the requirements for the
degree of Master of Education at Massey University

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Abstract

The Internet has the potential to foster significant changes in the way education is organised and conceptualised. The problem underlying this study is that of the role of the Internet in education. This study aimed to describe and analyse the experiences of a group of student teachers as they used the Internet during independent study time. The research questions focused on the thoughts and feelings that the student teachers had about their Internet use, the ways that they made use of the Internet and their interpretations of the Internet for their professional use, for children's learning, and the future of education.

An evaluative case study approach was chosen using a combination of questionnaires, interviews and diaries to gather data. The case for the study comprised the cohort of students in their second year of a two year training programme for a Diploma of Teaching. All members of this group were invited to participate and sixteen students chose to do so. The research was carried out in three phases over a six month period from March to September 1997.

The results indicate that the participants' skills in searching the Internet developed during the project, at least to beginners level. However, skill development using e-mail was less apparent. The major problem identified was that it was very time consuming to use the Internet. Usage patterns showed that the students were either 'low', 'medium' or 'high' users, with a third of the group in each category. 'Low' users tended to choose not to use the Internet, mainly due to its time consuming nature. 'Medium' users tended to be strongly focused on using the Internet as a professional tool and 'high' users tended to make recreational as well as professional use of the Internet. When considering the classroom use of the Internet the student teachers tended to stress its value as a tool for research by children, however they expressed concern about classroom management issues. With respect to the place that the Internet might take in education the future, these student teachers tended to support its use as a tool in a conventional classroom but argue against the Internet taking a major role in the organisation of education.

The results suggest that while providing student teachers with independent access to the Internet has some benefits, many student teachers are likely to need support in order to become competent Internet users. One of the conclusions of this study is that support for learning Internet skills in independent study time should be provided so that compulsory teacher education courses can focus on pedagogical issues. However, this study also concludes by arguing that an understanding of both the concept of the 'information age' and its implications for education, are necessary if teachers are to be leaders in debates on the role of the Internet in education. While this was a small scale case study it is clear from its findings that a great deal of further research into the pedagogical issues associated with the Internet is needed.

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Table of Contents

Candidate's Statement	i
Abstract	ii
Acknowledgments	iv
Table of contents	v
List of figures	x
List of Tables	xii

1. Chapter One - Research Context

1.1. Introduction	1
1.2. Background to this study	2
1.2.1. The development of the Internet	3
1.2.2. The modern and post-modern periods	5
1.2.3. The Internet in the post-modern	6
1.2.4. The 'information age'	8
1.3. Implications for education	11

2. Chapter Two - Literature Review

2.1. Introduction	13
2.2. Information, knowledge, and information technology	14
2.3. Information technology in education	16
2.3.1. Rationales for using information technology in education	16
2.3.2. Research into the use of information technology in education	18
2.3.3. Information technology in teacher education	19

2.4.	The Internet in education	22
2.4.1.	Developing information literacy	23
2.4.2.	Current uses of the Internet in classrooms	24
2.4.3.	Current uses of the Internet in teacher education	27
2.4.4.	The problem underlying this research	29
3.	Chapter Three - Methodology	
3.1.	Introduction	32
3.2.	Aim of the research	32
3.3.	Research questions	33
3.4.	The theoretical framework of the research	33
3.5.	Case study methods	34
3.5.1.	Justification for choosing a case study method	36
3.5.2.	Identifying the case	37
3.5.3.	Ethical considerations	38
3.6.	The research phases	39
3.6.1.	Phase one	40
3.6.1.1.	Data gathering instruments	40
3.6.1.2.	Selection of participants	41
3.6.2.	Phase two	42
3.6.3.	Phase three	43

3.7.	Data analysis	44
3.8.	Limitations of the methodology	45
3.9.	Summary	46

4. Chapter Four - Results

4.1.	Introduction	47
4.2.	Results - phase one	47
4.2.1.	Analysis of the gender and age of the students	47
4.2.2.	Prior experience with computers	48
4.2.3.	Summary of phase one results	50
4.3.	Results - phase two	50
4.3.1.	Students' descriptions of the Internet	51
4.3.1.1.	The content of the Internet	51
4.3.1.2.	How the Internet works	52
4.3.2.	How the Internet was used by the students	53
4.3.2.1.	The diary data	54
4.3.2.2.	The cost of Internet use	54
4.3.2.3.	Descriptions of Internet use	55
4.3.3.	How students felt about their Internet use	59
4.3.4.	Problems experienced by the students	62
4.3.4.1.	Problems in searching the Internet	63

4.3.4.2. Technical problems	64
4.3.5. The role of the Internet in children's learning	65
4.3.6. The role of the Internet in teaching	68
4.3.7. The role of the Internet in the future of education	69
4.3.8. Summary of phase two results	73
4.4. Results - phase three	75
4.4.1. Skill levels at the end of the research	75
4.4.2. Time spent on the Internet per week	76
4.4.3. How Internet time has been used	76
4.4.4. Results of the personal involvement inventory	78
4.4.5. Summary of phase three results	84
4.5. Summary of the results	85

5. Chapter Five - Discussion

5.1. Introduction	88
5.2. The process of learning to use the Internet	89
5.3. The utility of the Internet	92
5.4. The role of the Internet in the classroom	96
5.5. The role of the Internet in the future of education	97
5.6. Summary	99

6. Chapter Six - Conclusion

6.1.	Introduction	102
6.2.	The aim evaluated	103
6.2.1.	Limitations of the study	103
6.3.	Implications for research	105
6.4.	Implications for pre-service teacher education	106
6.5.	Implications for national policy on information technology	107
6.6.	Final remarks	108

References	109
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Appendices

A	Invitation to participate	122
B	Information for participants	123
C	Research consent form	126
D	Computer Network Acceptable Use Policy	127
E	Experience profile	129
F	Internet diary form	130
G	Memo 14/5/97	131
H	Phase three questionnaire	132
I	Invitation to phase three interview	136
J	Sample phase two interview transcript	137

List of Figures

Chapter four

Figure 4.1	The age and sex of students in the research project	48
Figure 4.2	The prior computer experience of the students	48
Figure 4.3	Skill levels of students with wordprocessing, e-mail and using the Internet.	49
Figure 4.4	Skill levels of students in using e-mail, finding information on the Internet and using Internet chat at the end of the research	75
Figure 4.5	The number of hours usually spent using the Internet per week	76
Figure 4.6	How Internet time has been used	77
Figure 4.7	Recreational use of the Internet	77
Figure 4.8	How helpful students found Internet access for planning for sole charge and College assignments	78
Figure 4.9	Number of students who received inappropriate material while chatting or while searching the Internet	78
Figure 4.10	The importance of the Internet	79
Figure 4.11	The interest of the Internet	79
Figure 4.12	The relevance of the Internet	80
Figure 4.13	The excitement of the Internet	80
Figure 4.14	How much the Internet means	81
Figure 4.15	The appeal of the Internet	81
Figure 4.16	The fascination with the Internet	82
Figure 4.17	The value of the Internet	82

Figure 4.18	Involvement with the Internet	83
Figure 4.19	The need for the Internet	83
Figure 4.20	Skill levels in finding information on the Internet at the beginning and at the end of the research	85
Figure 4.21	Skill levels in using e-mail at the beginning and at the end of the research	86

List of Tables

Chapter three

Table 3.1	Summary of the research phases	40
-----------	--------------------------------	----

Chapter four

Table 4.1	Classroom experience with computer software	49
-----------	---	----

Table 4.2	Students' usage costs sorted into increasing order of total cost	54
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Chapter One

Research Context

Computers don't just do things for us, they do things to us, including to our ways of thinking about ourselves and other people. (Turkle, 1995: 26)

1.1. Introduction

The Internet has the potential to foster significant changes in the way education is organised and conceptualised. Alternative ways of providing education are becoming possible because the Internet can collapse the boundaries of time and space, making it possible for the learner (adult or child) to choose when and where they will learn (Wentworth, 1995). Ultimately, the possibilities offered by the Internet offer radical alternatives to the conventional classroom, alternatives which could allow the learner to have more control over what they learn (Papert, 1993; Spender, 1995; Tiffin & Rajasingham, 1995). For example, in a recent report prepared for the Ministry of Education by Web Research (cited in Education Review Office, 1997) it was argued that using the Internet could result in students' learning being tailored towards individual needs. The report also argued that because learning could take place anywhere, the traditional custodial function of schools may need to be reconsidered. Clearly, the implications that the Internet has for the organisation and provision of education are important ones.

The way education is conceptualised is also influenced by technological change. This is evident in the argument that a reorientation of educational goals is necessary to ensure New Zealand's international economic competitiveness as an 'information' or 'knowledge' society (Butler, 1997). The influence of technological change on thinking about educational issues is also apparent in the Green Paper, Quality Teachers for Quality Learning - A Review of Teacher Education (Ministry of Education, 1997) in which it is argued that

the increasing pervasiveness of information technology in society requires that teachers have a level of proficiency that allows them to lead work in this area effectively in the

classroom [and that] in the face of advancing technologies, pressure to maintain the status quo in the organisation of learning simply delays the inevitable (Ministry of Education, 1997; 20).

Information technology, according to the Green Paper, can provide an alternative route to 'knowledge', a route which, it argues, will inevitably threaten the traditional role of the teacher. This has important implications for how education is conceptualised.

At this point in time, interest in the potential offered by the Internet is high, as indicated by a survey of computer use carried out by the New Zealand Ministry of Education which showed that 28% of primary schools were connected to the Internet with a further 59% intending to connect by January 1998 (Owens, 1996). Given the importance of the issues raised above there is a need to provide a research base which can be used to inform debate on the role that the Internet could and should play in education.

This research base needs to include research on the experiences that student teachers have when using the Internet. Because student teachers do not already have well established classroom practices and routines they are perhaps less likely to consider an innovation like the Internet as a threat to their current methods of teaching. However, their future practice will be informed by their experiences with the Internet and their interpretations of that experience. The research reported here was an attempt to collect some empirical evidence, and to describe and analyse, the initial Internet experiences of a group of student teachers.

1.2. Background to this study

This section outlines the history of the development of the Internet. Following this, the research context in which this study arose is described: this context being that of the great technological, economic and social changes which have characterised the last 25 years or so, and which have recently had a significant impact on educational debates.

The ideas and implications of this period of change - called hyper-modernism, post-modernism and/or 'information age' by different authors - have been the subject of extensive analysis by a wide range of different social theorists. Some of these ideas are outlined below, beginning with a description of the typical characteristics of the modern and post-modern historical periods and an account of the way that Internet experiences

can have post-modern characteristics. This is followed by an outline of the arguments associated with identifying the current period as the 'information age'. Finally, it is argued that these technological, economic and social changes have important implications for education. This study can contribute to the research base which will be required if there is to be informed debate on these implications.

1.2.1. The development of the Internet

Early developments in computer technology, particularly during World War II, were strongly associated with military command, communication, and control where information was a key resource. Investment in the computer and electronics industries during and after World War II was critical for the development of the current computer industry. Computer based technologies used for the processing and/or communication of information, widely referred to as information technology or IT, are now essential to many aspects of life, particularly commercial life. The concept of the Internet originated from the military need to provide a fail-safe communications network during the Cold War era of the 1960s, when nuclear attack from the Soviet Union was seen as a genuine threat (Starr & Milheim, 1996). Whilst it is possible for a technology to be used in ways that defy its origins, the legacy of command and control is, nevertheless, embedded in the Internet story (Sofia, 1993).

The Internet began in the 1960s as a U.S. Department of Defense project linking military and university computers through the provision of electronic mail (e-mail), remote login (through TELNET) and the transfer of files (through the file transfer protocol or FTP). By the 1980s the defence applications had moved to an exclusively military network, MILNET (Starr & Milheim, 1996). The universities, supported by the American National Science Foundation, slowly proceeded to develop the Internet interface to make it easier to use. Mosaic, developed at the University of Illinois in 1993, was the first Internet browser to use a graphical user interface and hypertext links which allowed the user to gain access to documents simply by pointing on the screen and clicking a mouse. These documents have come to be known as web pages. The World Wide Web is a network of web pages, currently estimated to number 150 to 200 million (Reynolds, 1997), located on computers all over the world. Any person with a personal computer,

modem, and an Internet account can access these pages. The Internet boom of the 1990s is based on a range of significant factors. These include: the falling cost of computers, more powerful computers that can provide multimedia presentations, the growth of commercial Internet services, strong marketing initiatives, easy access to web pages, and the enjoyment experienced by many Internet users.

The Internet as it exists today has been shaped by military thinking, academic thinking and, more recently, commercial thinking. As the use of the Internet becomes more widespread these various aspects are converging. The military command and control mentality is still evident, but it is the consumer (rather than a 'hostile' nation) that is now the focus of attention. The trend is for the consumer to be conceptualised in individualistic rather than group terms and Internet technology is seen as being a means of providing information and communication to meet individual needs. The concerns of the academic world have played a major role in shaping the Internet: for example, the academic focus on open debate has been significant in the development of newsgroups and listservers for on-line communication. Open access to research, information, ideas and knowledge in the academic arena has shifted the emphasis of the Internet from focus on controlling information and communication to a focus on the expansion of both. However, through growing commercial interests, the Internet is now a global corporate market as much as it is an academic meeting place. This is resulting in a trend for more shopping and entertainment options being provided and for there to be more advertising on web pages. There is also a trend towards the development of niche markets in which payment is required for access to particular web sites.

It is in the context of the Internet as described above that education is coming to be seen as just a commodity which can be designed according to individual needs, packaged, sold and delivered via the Internet. However, the Internet is also associated with its potential to give 'voice' to a wide diversity of cultural, political and personal viewpoints and as such, it challenges traditional notions of 'knowledge'. In education, these tensions can be conceptualised as a tension between the modernist and the post-modernist understanding of the nature of knowledge. The use of the Internet in education is one site at which these tensions are being played out.

1.2.2. The modern and post-modern periods

In order to make sense of the tensions described above between modernist and post-modernist views on the nature of knowledge and the role the Internet might play in giving expression to those tensions, it is important to first understand the basis of modernist and post-modernist thought. In this section some accounts of modernism and then post-modernism are surveyed.

Though technological change is not usually identified as the main determinant of modernism or post-modernism, it plays a significant part in the way each of these periods of time are discussed. In the case of modernism, the Enlightenment project (originating in the seventeenth century) of steady progress towards a better future is intimately associated with constant technological change. As outlined by many authors (Jameson, 1984; Kumar, 1995; Usher & Edwards, 1994), the concept of the rational, centred, autonomous subject postulated by seventeenth century philosophers (such as Descartes) was at the core of modernist thought. The French Revolution gave form to the idea of building political life on the basis of reason. The Industrial Revolution gave form to the power of rationality in transforming the material world through the application of science and technology. By the end of the eighteenth century the dual concepts of rationality and revolution had firmly established modernity, along with its key tenet of progress through endless innovation. Today, the modernist meta-narrative of ‘progress’ towards a better future is still strongly evident in popularised arguments for the utopian benefits of new information and communications technologies, for example, those expressed by Negroponte (1995) and Toffler (1981).

The technological, economic and social changes towards the close of the twentieth century have resulted in the widespread claim that we are moving beyond the modern period and into the post-modern era. While post-modernism is difficult to define, a central theme is the undermining of the modernist faith in science and rationality as routes towards progress (Lyotard, 1984; Usher & Edwards, 1994; Kumar, 1995). According to these authors, without traditional science at the centre of the processes through which knowledge is authorised, a condition of uncertainty has begun to pervade

thought and action. Thus the post-modern world is a world of instability and rapid change and where:

knowledge is constantly changing and meaning 'floats' without its traditional teleological fixing in foundational knowledge (Usher & Edwards, 1994: 10).

However, the recognition by post-modernists that all 'knowledge claims' are situated in socio-cultural contexts and imbued with power interests so that they are partial (rather than universal) is, for them, a source of celebration rather than despair (Haraway, 1988). One factor contributing to the constant change of 'knowledge' has been the increasing global use of computer based technologies (often called information technology or IT) for the speedy processing and communication of information. This trend towards greater and greater use of IT in all aspects of life can be associated with experiences of information overload and also with a lack of certainty about what can be 'known'. These experiences are relevant to this study of student teachers using the Internet.

Along with the attack on rationality (as it has traditionally been defined), there are some other generally agreed upon characteristics of post-modernism. These include ideas of decentralisation, dispersal, fragmentation, pluralism and individualism. Many of these have been strongly influenced by the development of the global information and communication networks that now form the mass media and the Internet. For example, global rather than centralised production has only become possible through the use of IT. Fragmentation (of, for example traditional social groupings) is one of the consequences of this shift in both the means of production and the dissemination of information (Webster and Robins, 1986; 1987; 1989; cited in Kumar, 1995). Making culture into a global commodity is another characteristic of post-modernism; for example, the Disney 'culture' with its associated mass marketing through television, film and product tie-ins (Kinder, 1991). Post-modernism is also characterised by the eclectic, simultaneous acceptance of many (often apparently contradictory) traditions.

1.2.3. The Internet in the post-modern

Each of the characteristics of post-modernism outlined above could be expanded on. However, for the purposes of this study, the way that experiences in using the Internet can be seen as experiences which are characterised by uncertainty are the most important

to outline in more detail. This uncertainty may be uncertainty about what is 'real'. As Usher and Edwards, paraphrasing Baudrillard (1988) put it:

The communication/media 'revolution' means that people are engulfed by 'information' to the extent where the distinction between reality and the word/image which portrays it breaks down into a condition of hyperreality (Usher & Edwards, 1994: 11)

The argument is that there is no distinction between the simulations created on the Internet and what is 'real'. The illusionary is not a copy but a *simulacra*: a copy without an original, without a referent. Signs and images do not betray the real, rather they exist as the hyper-real (Baudrillard, 1987; 1988; cited in Kumar, 1995).

The uncertainty may also be uncertainty about oneself. In what Poster calls the 'second media age':

postmodernity or the mode of information indicates communication practices that constitute subjects as unstable, multiple and diffuse (Poster, 1995: 32).

Interactivity, particularly through the Internet, is one of the mechanisms for this new constitution of the subject (or self). According to Poster,

observers of and participants in Internet 'virtual communities' repeat in near unanimity that long or intense experience with computer-mediated communities is associated with a certain fluidity of identity (Poster, 1995: 35).

Whilst the consequences of these experiences are emergent, Poster argues that electronically mediated communication:

clears the way to seeing the self as multiple, changeable, fragmented, in short as making a project of its own constitution (Poster, 1995: 77).

Turkle (1995) argues that the technological experiences are only one factor contributing to the illusory nature of a central, unified agency, or self, that is characteristic of life in the post-modern. For her, while technology is not seen as being the *cause* of such experiences it can, and does, contribute to the exploration of the multiple and shifting characteristics of our conceptions of the self. In her recent work she focuses on the Internet based experiences of a group of Americans who use e-mail, Internet Relay Chat (IRC) or simulation games called Multiple User Domains (MUDs) (Turkle, 1995). The experiences of constructing identity on-line that she describes are part of a larger cultural context in which the boundaries between the living and the cybernetic, and between the

real and the simulated (or virtual/hyper-real), are being eroded. She argues that people are seeking an intimate machine as they choose an on-line environment in which to explore multiple facets of the self, including erotic and intellectual fantasies. Turkle argues that whether or not these explorations can lead to psychological growth:

is reassuringly complicated, just like life. If you come to the games with a self that is healthy enough to be able to grow from relationships, MUDs can be very good. If not, you can be in for trouble (Turkle, 1995: 205).

In attempting to identify the positive consequences of these experiences she argues that:

as we sense our inner diversity we come to know our limitations. We understand that we do not and can not know things completely, not the outside world, not ourselves.

Today's heightened consciousness of incompleteness may predispose us to join with others... A more fluid sense of self allows a greater capacity for acknowledging diversity. It makes it easier to accept the array of our (and others) inconsistent personae - perhaps with humour, perhaps with irony. We do not feel compelled to rank or judge the elements of our multiplicity. We do not feel compelled to exclude what does not fit.

(Turkle, 1995: 261)

As educators attempt to acknowledge and reflect diversity in the everyday context of classrooms, it is important that they consider the possibilities for engaging with diversity that are offered through on-line communication with the Internet. Given this, it is important that we begin to collect some data showing how people experience these technologies in educational contexts. In this study student teachers were offered the opportunity to participate in 'virtual communities' via the Internet and to reflect on what this participation might mean for both themselves and education in the future.

1.2.4. The 'information age'

While the military origin of the Internet clearly locates it within a modernist framework where the power of rationality provides a means of control over events, the Internet is also strongly associated with the changing conceptions of knowledge that are occurring as part of the shift into post-modernism. The Internet is also associated with the changes (especially in global industrialisation) that have been brought about through computerised information and communication systems. Bell (1980a) has argued that these changes are significant enough to justify conceptualising this period as the

'information age'. Whereas the first Industrial Revolution was based on steam and the second on electricity, he argued that the third Industrial Revolution is characterised by the way information is processed and disseminated. According to Bell:

knowledge and information are becoming the strategic resource and transforming agent of the post-industrial society (Bell, 1980a: 531).

For Bell, knowledge and information are interchangeable as the overriding organising principles for the current social order in the West and as the main source of 'value' (as opposed to the classic Marxist idea that labour is the source of value) (Kumar, 1995).

The idea of the 'information society' originated in Japan as well as in the West. Morris-Suzuki (1988) provides evidence for the idea's origin in the 1970s through the lobbying of the Japanese government for financial support by computer companies. According to Morris-Suzuki the development of this concept was associated with utopian ideas of increased leisure, prosperity and intellectual creativity. However, it was also linked with the recognition that while prosperity reduces physical needs it tends to increase the importance of emotional or psychological needs, and therefore of marketing. According to Morris-Suzuki:

[increased prosperity] influences the type of goods which consumers demand. Greater and greater emphasis comes to be placed on fashion, style and quality, and, as a result, a larger and larger share of the price of goods is attributable, not to material or labour costs, but to 'information costs' - research and development, design and so on (Morris-Suzuki, 1988: 9).

Thus, the development of the 'information age' is strongly associated with the development of a consumer culture. According to Jameson (1984), in the post-modern era, people's identities are formed more by their patterns of consumption than by the nature of their work. He argues that in post-modernism, people are primarily positioned simply as "desiring machines" and not as the occupiers of particular socio-economic positions, as political subjects, or as the originators of knowledge. They are the subjects at which an endless array of new images and identities are directed, in order that new and different desires will be produced in them, so that they will consume in new and different ways. For Lyotard (one of the most well-known theorists of post-modernism) in the post-modern era, knowledge itself has become nothing more (or less) than a commodity.

Rather than being a set of demonstrable, universal truths, as it is in modernist thought, for Lyotard, knowledge in post-modernism is something which is important primarily through its “use-value” in the market place (Lyotard, 1984).

According to Jameson and Lyotard, not only do we live in the ‘information age’, but knowledge-based economies now predominate globally. Knowledge drives the economy through instigating innovation and economic growth. Braun gives a more specific description of what constitutes this knowledge:

knowledge of the latest technological methods, knowledge of markets, knowledge of regulations, knowledge of opportunities and pitfalls, knowledge about the capabilities of competitors (Braun, 1995: 17).

This type of ‘information’ or ‘knowledge’ requires considerable skill to accumulate, synthesise and use. There are very real consequences of information overload. Such information is also rapidly redundant (Braun, 1995).

Haywood (1995) has argued that while it is generally accepted that competitive advantage arises from knowledge surpluses it is not always clear exactly how knowledge surpluses are generated. However, investment in research, working at the cutting edge of some engineering domains and fostering an enterprise culture are recognised as key aspects of the process. Haywood argues that the need for a well informed public is accepted uncritically and enthusiastically when competitors are seen to have a better educated workforce. However, the role of education of the general public in accumulating knowledge surpluses is unclear and hard to quantify.

Another argument for the recognition of the ‘information age’ as opposed to the ‘industrial age’ is that knowledge based industries now form the major source of employment in Western countries. There is some evidence to support this argument (Bell, 1980a), but it has been counter-argued that the increasing number of knowledge based jobs is really just an example of ‘credential inflation’. According to Morris-Suzuki, many of these knowledge-based jobs involve low level skills of *information transfer* rather than *information production* (Morris-Suzuki, 1988).

Some critics of the ideas associated with the ‘information age’ have argued for making a distinction between information and knowledge. For example, according to Kumar:

information abounds, but there is little concern with embodying it in a framework of knowledge, let alone cultivating wisdom in its use (Slack, 1984; Marien, 1985; cited in Kumar, 1995: 32)

Enthusiasts for the ‘information age’ argue that it offers a ‘superhighway’ to a good life of increased democracy, leisure and wealth (Toffler, 1981). This is highly debatable when, as outlined above, the profit motive is a major determinant of the direction of the vast majority of IT initiatives, including the development of the Internet.

1.3. Implications for education

All of this has important implications for education. According to Kenway, Bigum, Fitzclarence, Collier and Tregenza (1994) knowledge in post-modern education will be merely a commodity to be marketed to ‘consumers’ □ the students. They point out that the costs, consequences and ethical considerations of what they call “the unconstrained celebration and promotion of the market and technology” (Kenway et al., 1994: 330) need to be considered by policy makers and educators. Because the commodification of knowledge is a relatively new development in education it raises many issues which remain unresolved. These include: the widespread conflation of ‘information’ with ‘knowledge’, the niche marketing of ‘knowledge’ to different target groups of consumers, the reduction of education to merely ‘knowledge’ acquisition and the possible undermining of the idea that learning is a social activity - to give just a few examples.

The form that education, particularly primary education, might take in this context of change into an on-line world should not be considered inevitable, but should be the subject of wide and informed debate. For example, Bell, one of the originators of the concept of the ‘information age’, argues against technological determinism in the following way

In my work on post-industrial society, I have reiterated the point that change in the techno-economic order (and that is the realm of information) does not determine changes in the political and cultural realms of society but poses questions to which society must respond (Bell, 1980b: 573).

It is highly likely that teachers who enter the profession at this point in time will need to take part in debates about the appropriate uses of the Internet in primary education. It is therefore, useful to begin the exploration of the potential of the Internet with a focus on the viewpoints of pre-service student teachers as they begin their careers. This was the purpose of this study.

The following chapter reviews a wide range of literature on the use of IT in general, and the Internet in particular, in education and in teacher education. The methodology for the case study is outlined in Chapter Three. Chapter Four describes the results of the study. Key issues arising from the results are discussed in Chapter Five and Chapter Six provides some concluding comments.

Chapter Two

Literature Review

You don't need to know when you can constantly look something up, when you can play it again; you don't need to be able to recall when you can always retrieve (Spender, 1995: 107)

2.1. Introduction

Many technologies have been introduced into education accompanied by claims that they have potential for revolutionising some aspect of teaching and/or learning (Atkins, 1993). This review of the literature which describes and analyses the experience gained over the last twenty years of using IT in education, provides a basis for this study. The chapter begins with a discussion on the relationships between information, knowledge and the use of IT in education. This is followed by an outline of some of the different rationales for using IT, of research into the use of IT in education, and of some of the issues associated with teacher education in the use of IT. The focus in this review of the literature is on education in classrooms at primary and/or secondary level.

Following this the literature which is more specifically about the Internet is reviewed, beginning with a survey of some of the rationales for the use of the Internet in education. One aspect of Internet use is the development of information literacy: hence some issues associated with this are outlined. Then, some of the literature that is specifically about how the Internet is currently being used in primary classrooms is reviewed, as is some recent research into the use of the Internet in teacher education. Finally, having reviewed the literature on the wider social context (in Chapter One) and the educational context (in this chapter), the problem which motivated this research into the experiences of pre-service teachers as they use the Internet is outlined.

2.2. Information, knowledge, and information technology

Some aspects of the theoretical justification for the concept of the ‘information age’ were outlined in Chapter One. The following section discusses the distinction between data and information, and provides some contrasting perspectives on the relationship between information and knowledge.

The concept of information is not a precise one. Attempts have been made to provide technical definitions. For example, Shannon’s work in communications theory during the early 1950s defined information in terms of

quantitative measures of communicative exchanges, especially as these take place through some mechanical channel which requires messages to be encoded and decoded, say into electronic impulses (cited in Roszak, 1994).

Within communications theory, information is simply data which is transmitted. The semantic meaning of the information is not important. Other technical definitions of information often emphasise that data (in the form of numbers, letters, words or symbols), requires deciphering in order to make it meaningful (Haywood, 1995).

Information is the outcome after some structure, or meaning, is imposed on data.

Information is also often characterised as being purposeful, as in this definition from Bell:

information is a pattern or design that rearranges data for instrumental purposes (1979, cited in Liebenau & Backhouse, 1990).

As outlined above, information derives from data. However, the association of information with meaning and purpose commonly results in the term ‘information’ being used as if it is interchangeable with the term ‘knowledge’.

In contexts in which the having of knowledge is regarded as the ability to recall information, the two concepts can be interchangeable. For example, Bloom (1956) uses these concepts together, particularly at the lowest levels of his taxonomy of educational objectives. He says:

by knowledge, we mean that the student can give evidence that he (sic) remembers, either by recalling or by recognising, some idea or phenomena with which he has had experience in the educational process (Bloom, 1956: 28).

He goes on to say that:

although information or knowledge is recognised as an important outcome of education, very few teachers would be satisfied to regard that as the primary or sole outcome of instruction. What is needed is some evidence that the students can do something with their knowledge, that is, that they can apply the information to new situations and problems (Bloom, 1956: 38).

Bloom's taxonomy separates knowledge from intellectual skills and abilities such as comprehension, application, analysis, synthesis and evaluation. In this taxonomy these form a hierarchy of thinking skills which can be used *along with knowledge* to solve problems. Bloom acknowledges the philosophical debate about what is knowable, recognising that "knowledge is always partial and relative rather than inclusive and fixed" (Bloom, 1956: 32). However, in the context of schooling, he argues that knowledge is generally constituted as "what is currently known or accepted by experts or specialists in a field" (Bloom, 1956: 32). This view of knowledge is widespread amongst those involved in education. Education is, in general, not seen as being the acquisition of bits of important knowledge (or information) but as being a process of learning to learn - in ever more complex and sophisticated ways - and as being the development, in students, of the skills required to do this.

Following from this, there is a body of literature which is critical of the emphasis on using IT in education. For example, Haywood (1995), Postman (1993), Roszak (1994) and Stoll (1995) argue that education becomes the mere accumulation of information when IT use dominates educational processes. For these authors learning, (or knowledge construction) is associated with the active processing, rather than recall, of information. This processing involves thinking and interacting with ideas. Roszak, for example, distinguishes 'ideas' from 'information' in the following way:

The mind thinks with ideas, not with information. Information may helpfully illustrate or decorate an idea; ...But information does not create ideas; by itself it does not validate or invalidate them. An idea can only be generated, revised or unseated by another idea. A culture survives by the power, plasticity and fertility of its ideas. Ideas come first because ideas define, contain, and eventually produce information. The principle task of education, therefore, is to teach young minds how to deal with ideas: how to evaluate them, extend them, adapt them to new uses" (Roszak, 1994: 88, italics in the original).

Ideas, according to Roszak, are necessary for information to have meaning or purpose and thinking processes do not necessarily require information or the use of IT. However, this does not mean to say that IT tools can not be used as part of activities designed to help students think and process ideas. Over the years, diverse rationales have underpinned the use of IT in education and some of these are described in the next section.

2.3. Information technology in education

Chapter One provided some of the background to the current context of technological, economic and social change. It outlined both the ideas and theories associated with that change and the significance of developments in IT in motivating change. In complex ways, all of these changes have impacted on schools. These changes have implications for how knowledge is perceived and this in turn has more general implications for changes to the education system. In particular, since the advent of microcomputers in the mid 1970s, there have already been changes as primary schools have introduced IT into classrooms (Nightingale & Chamberlain, 1991). A range of the different rationales that have been put forward for introducing IT into classrooms are outlined below. Following this, some of the debates that have taken place in the research literature about the use of IT in classrooms and the issues arising in teacher education relating to the use of IT are summarised.

2.3.1. Rationales for using information technology in education

Bigum (1995a) has identified four broad interest groups that have contributed to the debate on the use of IT in education. He characterises these as: 'boosters', 'de-schoolers', 'doomsters', and 'critics'. 'Boosters' (for example, Papert, 1980; Pea & Sheingold, 1987) are strong advocates of the educational benefits that can result from using IT in teaching and learning. They have focussed on investigating how education can best adopt and adapt to IT. In many ways, the modernist idea of education as providing a rational, individual progression towards 'enlightenment' underpins the philosophy of this group. The 'de-schoolers' (for example, Papert, 1993; Perelman, 1992; Tiffin & Rajasingham, 1995) are also technological enthusiasts but they tend to argue that the current model of schooling reflects a factory model, and that in the

'information age', new structures are needed. The 'doomsters' (for example, Postman, 1993; Stoll, 1995) argue that there is more to education than the accumulation of 'information' and that IT threatens to undermine traditions that ought to be retained. For this group, education for 'enlightenment' is of key importance. Finally, the 'critics' (for example, Apple, 1986; Bigum 1995b; Bigum & Green, 1992) are interested in exploring what IT might offer in education, but challenge the taken-for-granted assumptions about its benefits. This group are aware of the wider political and economic context and of the criticisms of the 'information age' made by commentators like Webster & Robins (1986;1987;1989; cited in Kumar, 1995).

Brown (1997, citing Pelgrun & Plomp, 1993) has also attempted to provide a framework for the driving forces behind the adoption of IT in schools. He argues that there are at least eight different rationales driving schools to invest in IT. These include: a vocational rationale focussing on equipping students with technical skills needed in a competitive workforce; an economic rationale focussing on building an 'information smart' workforce with the adaptive citizens required to compete internationally in the 'information age'; and a social rationale which focuses on the need to learn how to participate in social life in the 'information age'. Taking the 'information age' idea a step further, the transformation rationale is used to argue that IT will accelerate school reform or possibly render the concept of school obsolete. A commercial rationale is used to argue that the IT industry benefits from school investment and consequently, school pupils learn to be the IT users/consumers of tomorrow. A marketing rationale justifies IT investment in order to attract pupils to the school in a competitive environment, and a cost-effectiveness rationale is sometimes used to argue that using IT can reduce staffing costs in schools. Finally, a pedagogical rationale is based on the idea that IT can be used to enhance students' social and cognitive learning. Brown (1997) argues that these different rationales all compete to influence IT practice, but that as teaching professionals it is important to emphasise the pedagogical rationale. This requires critical debate to explore and articulate what constitutes 'good practice' in using IT.

2.3.2. Research into the use of information technology in education

Over the last twenty years the use of IT for teaching and learning has been explored using a number of models in which emphasise different pedagogical frameworks and different relationships between learner and computer. For example, it is possible to learn 'from' the computer through computer assisted instruction (Cuban, 1986; Ministry of Education, 1994); 'with' the computer as a tool (Cochran-Smith, 1991); or 'about' the computer through computer literacy courses (Jennings & Smits, 1986). Alternatively, it has been argued that we can construct what we learn through 'teaching' (or programming) the computer (Papert, 1980). More recently there has been an emphasis on the social contexts of learning with authors like Crook (1994) arguing for approaches based on student learning through collaborative tasks involving computers.

Research into the use of computers in education over this period has been problematic. The focus of early work was on computer assisted instruction (CAI) and on attempts to identify whether or not computers had positive effects on teaching and learning, characteristically using experimental methods which relied on technological 'treatments' and comparative control groups. This work was unable to identify significant gains from technological approaches (Edwards, Norton, Taylor, Weiss, & Dusseldorf, 1975 cited in Roblyer, 1996). Subsequent summaries of results across studies indicated that if there was any pattern at all, it

seemed to be that the overall effect of technology use on the people or topic being studied was a small, positive one (Roblyer, 1996).

The methodology of many of these studies has been criticised (see for example, Clark, 1983, cited in Roblyer, 1996) for failing to control for variables such as instructional design. The limitations of experimental methods were also criticised for their narrow focus and their lack of relevance to 'real' teaching and learning situations. Participants in this debate include Papert (for example, Harel & Papert, 1990) who argued for the value of qualitative methods which shed some light on the 'total classroom environment' rather than isolating the small effects of particular variables. Papert (1980) recognised that without high access to computers any real impact on learning would be minimal. However, even with ready access to computers, research to date does not substantiate Papert's claims for the fostering generalisable problem solving skills through experiences

with computer based microworlds (Kurland, Clement, Mawby, & Pea, 1987; Pea & Kurland, 1987).

Roblyer (1996) has summarised the research situation as follows:

for many decision makers who look to educational research to supply a solid rationale to justify increased technology budgets and integration into classrooms, the result has been confusion and consternation (Roblyer, 1996: 14).

In attempting to make educational research more valuable, current approaches attempt to understand 'good practice' within a more holistic framework which takes into account teacher, pupil, environmental and curricular issues (for example, Brown, 1995a). As Recker has argued (1997), the introduction of IT into educational contexts has, this far, been driven more by the developers of the technologies than it has by educational concerns.

2.3.3. Information technology in teacher education

The competing rationales for IT use, the pedagogical ideas underpinning various approaches to using IT and the research on computers in the learning process have all influenced teacher education. Teacher educators have attempted to improve the technological competencies of both in-service and pre-service teachers. They have also been searching for a suitable mix of educational theory and practice (including building personal skills and emphasising pedagogy) which will result in teachers actually making use of IT. In New Zealand, between 1992 and 1996, 7,000 out of 50,000 teachers have received some IT training (Perry, 1997). However, there are a number of difficulties associated with using IT in classrooms and there are also a range of models suggested for understanding the processes involved in adopting IT innovations. Some of these difficulties and models are described below. As Brown (1995a) points out, proficient computer using teachers are still the exception rather than the rule.

In pre-service teacher education it is common practice for a small number of informed IT users to teach IT skills within the context of formal courses (Oliver, 1994a). Commonly, the main focus of these courses is on the development of computer skills, as these are seen as necessary precursors for the classroom use of computers. In terms of improving students' skills these courses are often successful (Wild & Hodgkinson, 1992, Oliver,

1994a). However, the acquisition of computer skills alone seems to be insufficient for subsequent use of IT in classrooms. Oliver (1994b) found that in Australian schools where access to hardware and software was not a barrier, 75% of beginning teachers made no use of computers for instructional purposes.

A range of responses to this problem are canvassed in the literature. For example, Wild (1995) argues that pre-service training should focus primarily on the development of student knowledge of learning theory and pedagogy, rather than computer skills. Oliver (1994a) argues that IT experiences need to be integrated into training in a more holistic way. Wild and Hodgkinson (1992) suggest that student teachers should be able to take a more autonomous approach to their training through self direction. After a course that involved student choices about what was learnt, Wild and Hodgkinson found that 70% of student teachers claimed to have used the computer on their main teaching practice. Given that certain skills are necessary but not sufficient to achieve some uptake of IT in classrooms, Bigum (1990, cited in Somekh & Davis, 1997) has suggested that self-teaching be promoted via 24 hour access to computer facilities with technical support available. He argues that this 'situated learning' is expected to be more highly transferable than learning experienced in formal courses. However, it is also acknowledged that for some learners, a sympathetic teacher is required to reduce the anxiety that is associated with using information technology (McInerney, McInerney, & Sinclair, 1994).

Reasons for the lack of successful integration of IT into classroom learning are not difficult to identify. For example, Collis (1996a) identifies a number of typical problems, including too few computers, unreliable hardware, unsophisticated software, and insufficient time spent in training. In trying to pinpoint what might underlie the minimal use of IT in classrooms, despite the many attempts to eliminate the problems, Collis recognises that there has been a lot of 'push' from outside but little 'pull' from teachers. She argues that this is largely because, in general, teachers do not see the this technology as being particularly useful in addressing genuine educational needs.

There are many ways that IT can be introduced into the learning environment. For example, using IT can be approached as "little more than a technical procedure which has little or no impact on the process of teaching and learning" (Somekh, Whitty, &

Coveney, 1997: 207). Alternatively, it is argued that using IT can result in significant changes to the role of the teacher. For example, it can

requir[e] a fundamental and continual process of rethinking what is taught, how it is taught, and why. If this change is not to be externally imposed, teachers will themselves need to develop reflective classroom practice that enable them to make best use of the educational and professional opportunities as they open up (Scrimshaw, 1997: 112).

The processes which individual teachers commonly move through as they engage with IT have been described in a number of ways. Harris (1996), for example, describes three stages. The first of these is an 'exploratory stage' in which the features of the innovation are tested, followed by a 'discovery stage' in which there is increased enthusiasm and confidence in use and 'promotion stage' in which expanded use through a school is encouraged. Faison (1996), on the other hand, describes the stages as 'entry level' (where the usefulness of technology is acknowledged), 'adoption' (where the technology is included in planning), 'adaptation' (where the technology begins to increase productivity), 'appropriation' (where technology is used effortlessly) and finally 'invention' (where fundamental changes in teaching are explored).

However, these models take no account of the degree to which IT integration may be resisted. Collis (1996a) provides a model that has greater explanatory power. She recognises that accepting an innovation is most likely when the pleasure or the payoff in using the innovation exceeds the problems experienced. She argues that enthusiasts and non-enthusiasts differ in their interpretations of each of these variables. With respect to the Internet, she argues that it is more widely appealing than previous IT innovations and hence using it may result in greater pleasure being experienced by teachers and hence greater uptake. However, Collis also argues that technological innovations have usually been solutions in search of problems and hence largely ignored by the majority of teachers. While the Internet is often perceived as being appealing, she argues that educational questions and issues should take priority over simply using the Internet for its own sake.

2.4. The Internet in education

The rationales for introducing IT into classrooms and the research into IT use in both education and teacher education provide a background to the current interest in the Internet. Three arguments are frequently used to justify the use of the Internet in education. The first of these is that the Internet will be a critical tool for the 21st century, and because of this children need to learn how to use it (Trewern, 1996; Wagner, 1996). This justification belongs to the vocational rationale described above in Section 2.3.1. The second argument is that the Internet is inherently interesting for young people to use (Negroponte, 1995; Papert, 1993; Spender, 1995; Tiffin & Rajasingham, 1995). Spender (1995), for example, argues that a constructivist approach in which young people can make their own decisions about what to learn through ‘playing’ with information is exciting and entertaining (Spender, 1995: 108). In contrast, she claims that book based learning is identified by children as static and boring. Papert (1993) provides a futuristic vision of children acquiring knowledge through exploration of a vast, interactive multimedia library that he calls a ‘knowledge machine’. He says “the enormous potential market for a knowledge machine makes its eventual appearance inevitable” (Papert, 1993: 8). This rationale tends to combine elements of the pedagogical and social rationales as outlined in Section 2.3.1.

The third frequently used argument for using the Internet is that it can enhance learning through increasing the ‘authenticity’ of the classroom activities (Rakes, 1996; Davis, Desforges, Jessel, Somekh, Taylor, & Vaughan, 1997). This argument uses a pedagogical rationale. ‘Authenticity’ it is argued, is fostered through using ‘real’ information as part of an investigation and through having children communicate with people relevant to the investigation. Both possibilities can be supported by using the Internet. However, Davis et al. make the point that teachers have recognised that too much information, for example from the Internet, can hinder learning. These authors note the need to achieve a balance between the authenticity of a particular discipline (for example, that of genuine research), and the authenticity of the classroom context, which may require that information be selected to suit the learners.

The use of authentic research activities in classrooms involves the development of students' skills in information literacy. The next section describes some of the issues arising during the process of developing information literacy. This section is followed by an outline of some research literature on current uses of the Internet in classrooms and in teacher education.

2.4.1. Developing information literacy

Teacher educators and researchers interested in the development of information literacy recognise that building knowledge through the processing of information requires sophisticated 'high level' thinking (from the learner), and a clearly conceptualised teaching philosophy (Gawith, 1995; Moore, 1995; Rakes, 1996). Gawith (1995) conceptualises the process as one of 'knowledge construction' where learners are guided in both the control of technology and the control of learning processes (through negotiated control of learning objectives, planning, monitoring, evaluation and assessment). Gawith argues that the teaching of metacognitive skills (along with the literacy skills of summarising, clarifying, questioning and predicting) is required in order to create a 'knowledge construction environment', rather than one requiring only assembly of an 'electronic pastiche' (Gawith, 1995: 6). A 'knowledge construction' approach has been recognised as one that is very demanding - both for the learner, and for the teacher (Perkins, 1991). This is because the learner needs to make many complex decisions during the process and because the teacher needs to manage a situation where a diverse range of activities are taking place simultaneously.

Moore (1995) emphasises that teachers need to be skilled in assessing the appropriateness of different information sources for the particular children they are working with, especially as information technology allows children ready access to information sources designed for adults. Moore also comments on the need for information skills to be formally taught, making the distinction between easy access to information (via technologies like the Internet) and the ability to structure, integrate and transform information into personal knowledge. This, she argues, is a dynamic process requiring judgements about the relevance of information to the task at hand. These

judgement skills are particularly important in contexts of potential information overload, such as the Internet.

2.4.2. Current uses of the Internet in classrooms

In primary and secondary classrooms the use of the Internet is in its very early stages. In the literature that is currently available, anecdotal descriptions of classroom activities that use the Internet are common. Its possibilities and associated problems (particularly technical problems) are often highlighted. Some of the pedagogical issues arising out of these experiences and some of the methods of ensuring children's safety when using the Internet are described below.

There is a considerable array of literature written for teachers that describes what the Internet is and the possibilities that it offers for education (Brown & Ryba, 1996; Lai, 1996; Maddux, 1996; Trewern, 1996; Wagner, 1996). These possibilities include options for communication and for the sourcing and publishing of information. Trewern, for example, outlines a list of possibilities for interpersonal exchanges using the Internet, writing to 'keypals', electronic appearances of invited guests, electronic mentoring, information exchanges and virtual field trips (for example the Telecom Ice Bound project in 1995). Trewern also describes some problem solving projects involving information searches, parallel problem solving in different parts of the world, electronic process writing, social action projects (for example the Global Schoolhouse Project which focuses on environmental issues) and simulations. Lai, on the other hand, highlights the possibilities for creating learning communities which are:

characterised by a student-centred approach to learning with the learner engaged in situated, collaborative as well as cross-cultural learning activities (Lai, 1996: 4).

According to Lai, the process of networking alone does not produce collaborative relationships. He argues that collaborative tasks need to be deliberately designed into the activities. Trentin (1996) also argues that the Internet will only 'add value' to education if it is used in educationally worthwhile ways, for example to create small, cooperative learning communities which work together purposefully.

It is generally acknowledged that for many of today's teachers, gaining mastery of the Internet is challenging and requires patience and tenacity as well as access, time and training. However, integrating the Internet into classroom activities also takes

more time, creativity, endurance, proclivity towards change, a willingness to take risks, plus collegial and administrative support (Black, Klingenstein, & Songer, 1995a).

Black, Klingenstein, & Songer (1995a) describe the experience of the Boulder Valley Internet project where a large school district comprising 47 schools was networked.

These researchers found that in most cases the Internet was integrated into the existing curriculum. Teachers, particularly elementary teachers, tended to make most use of e-mail to exchange data and 'fact find'. Where labs were available for simultaneous Internet access there was high use of the network to complement research through libraries. Students were observed to find the use of real data motivating and relevant, and to have found the experience of computer based work enjoyable. However, the authors admit that their understanding of teaching and learning processes with the Internet is at an early stage.

The report on the Boulder Valley Internet project stated that the potential for the network to transform pedagogy was rarely realised and only then with a great deal of support, for example, through the Kids as Global Scientists Project (Black, Klingenstein, & Songer, 1995b). Black et al. found that teacher expectations that the Internet would be easy to use had been produced by media hype and that:

the Kids as Global Scientists Project has found it nearly impossible to meet these expectations so teachers may be disappointed (Black, Klingenstein, & Songer, 1995b).

The authors suggest that educators be encouraged to regard the Internet as a tool rather than a 'quick fix' for educational problems.

In Britain, the Hertfordshire Internet project included aims of finding out what impact the Internet had on learning and how it related to other information technologies (Kenny, 1996). They found that pupils' sense of personal interest and ownership of the particular information they found was increased through Internet use:

pupils will vie with each other to find the most impressive display of information which gives them a sense of esteem (Kenny, 1996: 29).

Internet use was found to require more patience and skill than using a CD ROM based encyclopedia (for example, the typing in of an Internet address was a considerable challenge!). However, Internet use was seen as worthwhile because it was an instrument that had currency beyond the school. Problems included accessing text that was beyond children's reading level, unreliable material, slow response times, and cost. Where schools participating in this project had published children's work on the Internet they said that this had in fact been more the work of the teachers than the students.

In New Zealand, research has been carried out to investigate both teacher and pupil use of Schoolsnet. This is a text based network, developed by the Ministry of Education, providing access to e-mail, Internet relay Chat (called 'chat') and educationally oriented information (Harris, 1996). Harris found that in most schools there was a small core group of staff who were Schoolsnet users and that communicating through e-mail was the most common use made by staff. Almost half of those surveyed (42%) had teaching objectives involving the Schoolsnet, but

fewer respondents achieved their objectives due to frustration with the interface, severe limits on access to computers, modems and phone lines, or uncertainty as to how to implement the teaching objectives with Schoolsnet (Harris, 1996: 53).

The teachers in this study also commented favourably on the concept of a network designed for educational use even though they suggested improvements to make Schoolsnet more attractive and easy to use. However, the cost of network access caused concern and Harris found that

many schools will not buy these resources, as the survey found schools who had already arrived at the conclusion that the communication costs for the Schoolsnet was beyond their budget (Harris, 1996: 56).

Overall, Schoolsnet was seen by those involved in this study as having potential which had not yet been realised.

School pupils were more positive about the benefits of using Schoolsnet with "92% saying that it helped their learning" (Harris, 1996: 53). Pupils used the network to publish their work, find information and tackle the "brawny brainteaser" problems provided. They also used Schoolsnet "to expand the 'playground', or social

environment" through using e-mail and 'chat' (Harris, 1996: 51). This was particularly the case for those pupils who were already experienced computer users.

Problems are frequently encountered when using the Internet. These include the enormous volume of web based information, the dubious reliability and credibility of some of the information, and the distraction from educational tasks that can result from the temptation to explore the web. Creating customised web documents to match curriculum goals has been recommended as a way of tackling these problems. (Quinlan, 1996). Here a sub-set of web pages is selected especially for classroom use thus minimising the possibilities of children being confronted with too much material or with unsuitable material.

Both teachers and parents have expressed concerns that the Internet can provide access to offensive material that has been banned from schools. This issue can be addressed technically through the use of software that censors and filters Internet access (for example, Cyber Patrol). It is also typically tackled through the signing of acceptable use policies (White, 1996; Truett, Scherlen, Tashner, & Lowe, 1997) and the fostering of on-line etiquette (known as 'netiquette', see Rinaldi, 1997). Other strategies involve monitoring student use, limiting time and access, only allowing searches for specific assignments, the keeping of logs and having well planned on-line activities (Brown, 1995b; Sanchez, 1995). However, it is likely that the use of the Internet will make it necessary to confront a number of potentially controversial issues in school contexts.

2.4.3. Current uses of the Internet in teacher education

Research into the use of the Internet in teacher education is growing. Some studies have considered the potential uses of the Internet for communication, for example, between student teachers and lecturers. The importance of developing Internet searching skills at tertiary level has also been noted in the literature. Finally, the experiences and perceptions that student teachers have when using the Internet are beginning to be studied.

Where the communication potential of the Internet has been explored there has been a focus on communication between lecturers and student teachers to complete course requirements and maintain contact with student teachers while on teaching experience. For example, Thomas, Clift and Sugimoto (1996) found that easy access to a free network was insufficient to promote e-mail communication. They note that student teachers may be reluctant to engage in spontaneous written discussion about issues, ideas or problems and they suggest that it is necessary to build e-mail use into course requirements so that responses to messages are required, rather than optional. Schlagal, Trathen, & Blanton (1996) used e-mail to communicate with student teachers during teaching experience. The success of the project was attributed in part, to the way e-mail communication was structured:

Three factors in our structure promote reflective dialogue: open, thematic groups; the direction and focus of messages; and time to write. (Schlagal, Trathen, & Blanton, 1996: 181).

Communications technologies are also being investigated for in-service education (Collis, 1996a, 1996b). Collis (1996b) suggests that meaningful learning experiences do not spontaneously arise out of teachers sending e-mail messages to each other. Instead, formal courses with some face-to-face component are needed. Alternatively, a network based project or task that provides a focus and purpose for communication is needed.

The need to develop skills in searching the Internet has been recognised in the literature. For example, Barry, (1996) suggests that information skills, both traditional and electronic, tend to be taken for granted at tertiary level. She argues that explicit discussion of strategies for searching need to be discussed with students because in an electronic world formulation of the information need must be more precise in order to construct explicit search language, and more focussed in the light of increasing information to avoid overload (Barry, 1996: 1).

Gillingham, Ellefson, Topper, & Worthington (1996) point out some of the difficulties in retrieving information from electronic databases. Citing the work of Marchionini (1992) they say that:

a potential hindrance to users searching hypertext is the "black box" phenomenon. This phenomenon occurs when a user enters an information query; the user is then presented

with a series of "hits" without a description of the processes that went into their selection. If the information returned is sufficient, there is no problem. However, if the information returned is insufficient, it may be helpful for users to have an understanding of the actual information retrieval process (Gillingham, Ellefson, Topper, & Worthington, 1996: 4)

Generally Internet search engines use this "black box" approach. Also, the trade secrecy that surrounds the way different search engines rank and weigh material does not make it easy to understand the retrieval processes used by search engines on the Internet (Reynolds, 1997).

The experiences that student teachers have as they use the Internet are beginning to be documented in research. For example Iseke-Barnes (1996) asked pre-service teachers to reflect on their experiences and their perceptions of themselves within those experiences as they used the Internet during a formal course. She found that for some students, while Internet communication initially produced fear, the 'mask' of anonymity eventually fostered increasing levels of comfort. However, for other participants in her study, fear of the possibility of becoming involved in on-line arguments was sufficient to enforce their silence. Students in this study had difficulties searching the Internet due to their lack of understanding about how information was structured and their lack of familiarity with the types of information that were likely to be available. The relationship between information and knowledge arose in this study, with participants tending to use these concepts interchangeably, and to equate information with power. This study is one of the few that have focused on the experience of pre-service teachers as they use the Internet. No studies have been identified which report on independent Internet use by pre-service teachers (rather than course based use). This is a gap which this study attempts to fill.

2.5. The problem underlying this research

The problem underlying this piece of research is that of the role of the Internet in education. As stated at the beginning of this thesis, the Internet has the potential to foster significant changes in the way education is organised and conceptualised. Chapter One outlined how the development of the Internet is associated with significant economic and social changes. At the end of Chapter One it was argued that there is a need for wide and informed debate on the implications that the Internet has for primary

education - rather than uncritically allowing developments in technology to determine developments in education. This is a debate in which teaching professionals at all levels could (and should) be participating.

In this chapter the literature on the educational use of both IT and the Internet has been surveyed. It is clear that the concepts of information and knowledge are often used interchangeably. However, it has been argued that the accumulation of information is only the most elementary form of knowledge development. Education, by definition, involves the development of the skills required to process, analyse, and synthesise information and to construct new forms of knowledge. Developing these skills of information literacy requires sophisticated teaching skills and the deliberate development in learning of meta-cognitive skills. Technological skills, such as those involved in using the Internet are also required, but are insufficient on their own.

The literature reviewed in this chapter indicates that sophisticated teaching skills are also required if the Internet is to be used to transform pedagogy, and in particular if it is to be used to increase the 'authenticity' of classroom activities. However, the evidence so far on the use of IT in schools suggests that only a minority of teachers use IT at all, let alone use it to transform their classrooms. Attempts at increasing the uptake of IT in classrooms through a variety of approaches in teacher education, particularly through the emphasis of pedagogical rationales to justify IT use, have not yet been widely successful. Overall, the use of IT in classrooms has a rather chequered history which does not provide clear cut evidence for learning being enhanced through its use. It is in this context that the Internet is currently being promoted as an important (if not vital) technological resource for education.

The literature reviewed above suggests a number of possible Internet futures. One is the commodification of 'knowledge' to the extent where schools are no longer seen to serve any useful purpose. In this scenario, an education could be purchased from an Internet based provider and teachers would no longer exist in their traditional roles. Another possibility is that the Internet could result in the transformation of school experiences from the rather predictable accumulation of received wisdom into genuine engagement

with 'real world' issues and problems. 'Knowledge' would be acquired in the process of problem posing and problem solving. For this to happen, sophisticated teaching professionals would be required. Yet another possibility is that the Internet could be domesticated into the current classroom context and used in relatively trivial ways to exchange e-mail and look up 'facts'. This would involve very little change to classrooms or the practice of teaching. On the basis of current research evidence, the uptake of the Internet in school classrooms has, thus far, produced only the last of these three scenarios.

It is clear that if the Internet is to be *educationally significant* a range of complex and serious questions need to be addressed. These would include asking why and how the Internet could be used. It is thus, very important that teachers (both in-service and pre-service) are well informed about what the Internet has to offer both now and in the future. Researching the interpretations that pre-service teachers make of the Internet when they use it independently will provide a starting point for reflecting on the process of educating teachers about the role of the Internet in primary education.

Chapter Three

Methodology

Symbolic interactionists assume that individuals' experiences are mediated by their own interpretations of experience. These interpretations are created by individuals through interaction with others and used by individuals to achieve specific goals. (Jacob, 1987: 27)

3.1. Introduction

This study was set in a context of rapid technological change and of strong marketing of the Internet as an essential technology for both personal and educational use. Interest in the use of the Internet by student teachers was high. This social context has shaped the aim of the research and has influenced methodological decisions. The following sections outline the aim of the research, the research questions and the theoretical framework used. A brief overview of case study methods is given. This is followed by a justification for the choice of a case study for this research. Ethical considerations are outlined. The three phases of the research are described along with techniques used for data analysis. Some limitations of the research are noted.

3.2. Aim of the research

The original aim of this research was to understand the experiences of student teachers when they use the Internet. In attempting to 'understand' social experience, complex philosophical and theoretical questions arise regarding the nature of external reality, the forms of knowledge that might be obtained and the relationship between human beings and the environment (Burrell & Morgan, 1979). An awareness of the limitations on what we can ultimately 'know' and 'understand' about the 'social' has led to a reframing of the aim into a more modest form, suitable for a research project of this scope.

The aim of this research became to describe and analyse the experiences of a group of student teachers as they used the Internet. It was to provide a 'subjective' description or interpretation of the experience, but also to use the ideas of current post-modern theorists to provide an analysis that went beyond the point of view of the participants

and took account of the wider social context. More specifically, the purpose of the research was to find out how student teachers conceptualised the Internet, how they used the Internet, how they felt about using the Internet and to identify problems that arose during independent use of the Internet (that is, outside of formal courses). It was also designed to find out how they interpreted the possibilities that the Internet offers: for themselves as teachers, for children as learners and for education now and in the future.

3.3. Research questions

The particular questions used to provide focus for this research were:

1. How do student teachers describe the Internet?
2. How do student teachers use the Internet during independent study time?
3. How do student teachers feel about using the Internet?
4. What problems arise for student teachers using the Internet during independent study time?
5. How do student teachers interpret the Internet for children's learning?
6. How do student teachers interpret the Internet for their professional use?
7. How do student teachers interpret the Internet for the future of education?

3.4. The theoretical framework of the research

The aims of this research were mainly interpretive (Smith, 1989; Hughes, 1990). Within the interpretive paradigm, this research drew on the tradition of symbolic interactionism in assuming that the experiences of individuals were mediated by their interpretation of interactions (Jacob, 1987). In this case, the interactions were with the Internet and with the others in research project. Meaning was seen to be derived and modified through social processes. The aim of the research was to interpret these meanings through the use of a descriptive and analytical research method.

A theoretical position on the 'meaning' of the students' Internet experience was not taken at the outset and the research did not aim to test any particular theory. Rather, the aim of the research was to identify themes and ideas suggested by data collected and to link these, in a critical way, with already existing theory. In doing so, this research drew on the 'grounded theory' approach developed by Glaser and Strauss (1967) and on the

work of Bogdan and Taylor (1975). In choosing to use existing theory after data collection, the viewpoints of critics of 'grounded theory' - for example, Altrichter and Posch (1989) - have been important. These authors make the point that theoretical viewpoints underpin any inquiry, though they may be more or less explicit.

Post-modern theoretical ideas, particularly those relating to the commodification of knowledge, the erosion of certainty (about knowledge and personal identity) and the notion of the 'information age', formed a background to this research. These have been outlined in Chapter One. The theoretical ideas arising out of the research into the use of IT in classrooms and more particularly, the Internet in both classrooms and teacher education are also relevant. These include the concept of competing rationales that underpin the introduction of IT into classrooms, the concept of authentic educational experiences, the concept of information literacy, the models of processes that teachers go through as they adopt IT and finally, the notion of transforming pedagogy through the use of technological innovations. These ideas have been outlined in Chapter Two.

3.5. Case study methods

Case studies are one of the research methods commonly used by symbolic interactionists (Jacob, 1987). A case study is a form of empirical inquiry that seeks to understand meaning within natural contexts. It is an approach to educational research than has arisen out of the critique of positivist research which aimed to control aspects of an educational setting in order to test hypotheses, measure effects and ultimately predict educational outcomes (Adelman, Jenkins & Kemmis, 1976). The concept of the 'case' has been used to distinguish this type of research from others. Case studies have been described as studies of "an instance in action" within a "bounded system" (Adelman, Jenkins & Kemmis, 1976, p. 140). It is important that the 'case' occurs naturally, but it is recognised that it has conceptual boundaries that are imposed by the researcher, for example, a lesson, classroom or school (Adelman et al., 1976). Case study methods can suit research which is focussed on processes and where flexibility and adaptability may be required as the research project progresses (Anderson, 1990).

Stenhouse (1982) identifies three styles of case study which "shade into each other": 'naturalistic', 'evaluation' and 'action research'. 'Naturalistic' studies are generally characterised by the use of ethnographic techniques such as participant observation. They generally involve immersion into the culture of a group (Wolcott, 1988) whilst maintaining the detached stance of an observer. 'Evaluative' case studies focus on providing evidence for judgement, particularly of educational programmes, with a view to decision making on future action or policy. Case studies carried out by a researcher in a context in which they act upon their own research findings on the other hand, fit the 'action research' end of the spectrum. Each type of study can draw on an eclectic range of data gathering techniques with a tendency to emphasise qualitative techniques. Quantitative techniques are, however, not excluded.

As indicated above, case studies can take many forms and as such there is not a well defined method associated with the approach. Critics have argued that many case studies are methodologically weak, especially when they have taken short cuts with ethnographic research methods (Atkinson & Delamont, 1985). The lack of rigour in method has led to attacks on the reliability of case studies, arguing that another researcher could come to a different conclusion based on the same data (Atkinson & Delamont, 1985). Triangulation is often used to strengthen the reliability of qualitative research in general and can be used in case study research. Three different approaches are possible. These are: between method triangulation (which provides multiple sources of data), between investigator triangulation (where more than one investigator gathers the data) or within method triangulation (where several types of data are gathered using one method) (Delamont, 1992).

The validity of the analysis of qualitative data is often established through checks with those who participated (Delamont, 1992). Case studies tend to strive for internal validity, that is, to really 'illuminate' some aspects of the case (Parlett & Hamilton, 1972). Internal validity can be strengthened by providing a chain of evidence which explicitly demonstrates how the analysis has been carried out (Anderson, 1990). The weakest aspect of case studies is that of their external validity, that is, whether or not it is possible to generalise beyond the case. This is problematic. Often, case studies claim to offer the

reader a “surrogate experience” where the “shock of recognition” provides a basis on which to generalise (Adelman et al., 1976). The extent to which the case is typical will influence the degree to which generalisation is possible. However, the argument for “naturalistic generalisation” which is both “intuitive and empirical” (Stake, 1980, cited in Atkinson & Delamont, 1985) has been criticised because generalisation needs to be underpinned by theoretical insight (Atkinson & Delamont, 1985). Overall, generalisation from case study research needs careful consideration.

3.5.1. Justification for choosing a case study method

The purpose of this research was to find out how participants ‘understood’ their own experience of the Internet. The study was intended to take place within an ‘authentic’ rather than an ‘experimental’ context. Though the provision of Internet access could be interpreted as a treatment, the intention was not to look for ‘effects’ but to try to understand the experience of the participants. In particular, participants were asked to reflect on their actual use of the Internet but also on the wider educational issues and implications that they associated with this technology. For these reasons an experimental approach involving the control of aspects of the setting in order to measure, verify and ultimately predict, outcomes was rejected as unsuitable.

An ‘evaluative’ case study approach combining questionnaires, interviews and diaries of Internet use offered the possibility of a deep understanding of the complex experiences of the participants (Mathison, 1988). In this research, a ‘case’ was relatively easy to identify: those students who had unrestricted access to the Internet. This approach offered the flexibility required for a long term study as the instruments used could be chosen as the study unfolded. This research was intended to be exploratory in that it provided a starting point for thinking about the uses of the Internet in teacher education and classroom settings. The decision to choose an ‘evaluative’ approach was based on the recognition that there is a need to understand or evaluate the Internet experience more deeply before taking ‘action’.

A ‘naturalistic’ approach using ethnographic techniques (Anderson, 1989) could have been suitable to explore the research questions, particularly those relating to the use of

the Internet and associated problems. The reasons for deciding not to take a participant/observer approach were twofold. Firstly, it was likely that the presence of the researcher would have inhibited, or otherwise influenced, the student use of the Internet. A requirement for participation in this research was the signing of an agreement to use the computer network in an 'acceptable' way (see Appendix D). However, in trying to find out how students used the Internet there was an awareness of the possibility that they would disregard the policy. They would be far less likely to behave 'naturally' if they were observed closely. Secondly, due to the length of the study and the fact that Internet use was during independent time, the possibility of 'immersion' in the situation was impractical. Instead of relying on observations of participants, the research was designed to involve repeated data collection through interviews and questionnaires which were used over a six month period.

3.5.2. Identifying the case

All of the students in this research were studying at Wellington College of Education. During 1997 there were four programmes of study offered for Primary Teacher Education at Wellington College of Education. These were a three year Diploma of Teaching, a four year BEd, a two year Diploma of Teaching and a one year Diploma of Teaching. The case identified for this research was a cohort of student teachers who entered the Wellington College of Education in 1996 on a two year training programme who had either a degree, a nearly completed degree, or recognition of related experience.

The selection of the case for the study was influenced by a number of factors, some of which were as follows: the financial constraints of the study, the desire to keep the research manageable and various ethical considerations.

The financial constraint was a budget of \$1,000 for Internet usage during the research (approved by the Manager of Research at the Wellington College of Education). If the research was to monitor usage over a six month period as outlined in the aim, and not exhaust the budget, the number of participants could not be too high. At the beginning of the research it was impossible to predict how many students would want to opt into the study, how high the Internet usage would be and how realistic the budget actually

was. However, in a context of the current popularisation of the Internet it was assumed that large, rather than small, numbers of students might wish to participate. This led to choosing from the one or two year programmes of study, as these have half the numbers of students as the three or four year programmes.

Setting up a manageable research project involved making choices to minimise numbers of participants as outlined above and also choosing students that were familiar with the use of resources and facilities at Wellington College of Education. Participants were asked to reflect on the use of the Internet for both professional and classroom use so it was necessary to have participants who had already gained some experience of teaching during their training. For these reasons the students in their final year of a two year programme were chosen for this research (rather than those in the one year programme). These students had already completed one year of their training. During the research they were preparing for their final teaching experience (when they assume full responsibility for a class over period of at least four weeks). There were a total of fifty six students in this cohort. All of these students were invited to participate and sixteen chose to do so. The process of self selection is described in section 3.6.1.2 below.

3.5.3. Ethical considerations

For ethical reasons the possibility of participating in the study needed to be offered to all members of a cohort. For example, the ethical standards of the American Educational Research Association caution against research techniques that might have “negative social consequences”, particularly “interventions that might deprive students of important parts of the standard curriculum” (AERA, 1992). In this situation participants were not deprived of any part of the standard training programme but access to the Internet could be considered to advantage the participants over other students in the cohort. For example, they could use the Internet as a tool for their assignment work. Hence it would have been unethical to select a subset of a cohort to participate.

The participants were provided with a two page information sheet outlining the aims of the study and the research questions and procedures (see Appendix B). They then completed a consent form (see Appendix C). After being interviewed, participants were given copies of their audio tape transcripts and offered the possibility of altering their

transcripts. The tapes and transcripts have remained confidential to the researcher and to the secretarial staff involved in transcribing some of them. There were a small number of participants in this study. In order to maximise confidentiality, letters of the alphabet have been assigned randomly to participants. These have been used instead of names when exerts from transcripts have been quoted to illustrate points in the results section.

Participants did not gain credit from Wellington College of Education for participation in the research, however their participation was acknowledged via a letter sent to their home addresses at the conclusion of the study. A copy of the results section of this thesis was attached to the letter.

3.6. The research phases

There were three phases to this research. Phase one, which began in March 1997, involved developing the data gathering instruments, identifying the sample from the case and gathering data to form a profile of the student teachers who participated. During phase two (April 1997 to August 1997), the student teachers had access to the Internet via individualised logins. The student teachers gained their Internet experience during independent study time, rather than in the context of a formal course of study. They were given unrestricted Internet access to Wellington College of Education laboratory computers (networked IBM Pentiums using Netscape Navigator 3 and Eudora for e-mail) between 8am and 5pm. Each participant was interviewed twice. The interviews were recorded on tape and then transcribed. During phase three (September 1997), the student teachers still had access to the Internet. Their experience over the research project was summarised using a questionnaire and five participants were interviewed in depth on their use of the Internet in teaching and learning.

The following table summarises the phases of the research:

	Invitation to participate	Information sheet	Consent Form	Acceptable use form	Profile	Diary	Interview	Questionnaire
Phase 1: March	✓	✓	✓	✓	✓			
Phase 2: April May June July August						✓ ✓ ✓ ✓ ✓	✓ ✓	
Phase 3: September							✓ for 5 students	✓

Table 3.1 Summary of the research phases

3.6.1. Phase one

Three data gathering instruments were developed during this phase: a profile form, a diary form, and a set of interview questions. In this section each of these instruments is described, along with the process used to select the participants.

3.6.1.1. Data gathering instruments

An instrument was required to establish a profile of the research participants which gave information on their gender, their age and both their prior experience and perceived skill levels with computers and with the Internet. The instrument chosen was adapted from one used by Mockford (1995) to profile and group student teachers according to their prior experience with information technology. This instrument was chosen because of its proven effectiveness in the Mockford study however Mockford's suggestion that it needed to be refined to make the rating of competencies more straightforward was taken into account. The profile questionnaire that formed this instrument was adapted in two ways. Firstly the number of software types was reduced from twelve to eight. These were wordprocessing, databases, spreadsheets, desktop publishing, multimedia authoring, drawing, electronic mail (e-mail) and Internet software (for both searching and browsing). Secondly, the distinction between competence and confidence was eliminated. Instead, the form (see Appendix E) required an indication of participants'

perceived skill levels and of where their experience had been gained (eg. in personal and/or classroom contexts).

During the research participants were asked to keep a diary showing what they did as they used the Internet. The recording sheet for the diary was adapted from that used in a recent study of the use of Schoolsnet; an on-line service available to New Zealand schools (Harris, 1996). It was chosen and adapted for ease of use. As the study was planned for a six month time frame this diary sheet needed to be designed to minimise the burden of completing it systematically, whilst still providing information on usage patterns which could be expanded on during interviews (see Appendix F).

Questions to be used during the tape recorded interviews were developed and trialed with colleagues on the staff of the Wellington College of Education. The interview questions were as follows:

1. How do you feel about using the Internet?
2. How would you describe the Internet?
3. How would you describe your experience of using the Internet?
4. What problems have arisen as you have used the Internet?
5. Thinking about children's learning how would you describe the role of the Internet?
6. Thinking about teaching, how would you describe the role of the Internet?
7. Thinking about the future of education, how would you describe the role of the Internet?

3.6.1.2. Selection of Participants

All students in the final year of the two year programme were invited to participate in the research through a leaflet placed in their personal mailboxes at the Wellington College of Education (see Appendix A). The first meeting to outline the research was held on Tuesday 18th March, from 10.30 - 11.00am, a time at which these students had no timetabled classes. Out of the fifty six students in the cohort, twenty attended this meeting and took the information sheet (see Appendix B), the consent form (see Appendix C), the computer network acceptable use policy (see Appendix D) and the questionnaire which aimed to produce a profile of their prior computer and Internet

experience (see Appendix E). Before their participation in the research was approved, students needed to sign both the research consent form and the acceptable use policy for the Internet. These forms were returned by seventeen students, at which point individual logins for each of them were set up. At the time of notification of the participant's login for the computer network, they were required to return the questionnaire profiling their gender, age and prior experience in using both computers and the Internet.

3.6.2. Phase two

The students were interviewed by the researcher during early April 1997 and again during the last week of June and the first week of July 1997. Of the seventeen student teachers participating, sixteen were interviewed. The student teacher who did not attend for the initial interview was advised that completing the interview was necessary for continued Internet access. Subsequently they withdrew from the research project. The interviews were tightly structured, respondent interviews (Powney & Watts, 1987), each taking approximately fifteen minutes. In the second interview, some of the comments from the first interview were read back to facilitate reflection by the participants on their previous responses. Tape transcripts were returned to the student teachers for comments, queries or changes. No comments, or requests for changes to the interview transcripts were received. A sample of an interview transcript is attached (see Appendix J).

As already outlined, the research was set up to monitor unsupported Internet use by students during their independent study time. When the students had technical problems (for example, problems in logging into the computer network) they approached the network manager for support. During the first set of interviews it was clear that some participants needed more information on searching using the Internet and on using the Eudora electronic mail (e-mail) software. They were provided with two articles on searching the Internet (Jones, 1996; Treadwell, 1997) and were given access to the Eudora e-mail manual. Support was offered by the researcher, but this offer was not taken up by any of the student teachers participating in the study (see Appendix G).

Students' diaries were forwarded to the researcher on an ad-hoc basis when the diary recording sheets were full. Internet usage in terms of bytes sent/received and cost was monitored for each participant on a monthly basis.

3.6.3. Phase three

A summary of the usage patterns during the research was obtained via a final questionnaire which was developed after consideration of data from the profiles, diaries and interviews. In order to identify both cognitive and affective aspects of the students' involvement with the Internet during the research, a personal involvement inventory using ten semantic differentials was used (De Vaus, 1991). This instrument had been tested and validated for measuring involvement with products in the context of marketing and advertising (Zaichkowsky, 1994). The questionnaire (see Appendix H) was sent to the participants at their home addresses on 17th September with a stamped addressed envelope for return. The postal system was used as the participants were not attending classes at the Wellington College of Education at the end of the research but were undertaking their final teaching experience. Fifteen out of the sixteen questionnaires sent out were returned.

In order to consider in more depth how 'low', 'medium' and 'high' users 'interpreted' the Internet for teaching and learning, two participants from each category were invited for a final interview (see Appendix I). Five interviews were carried out as only one of the 'low' use participants attended. These were respondent interviews but used a loose set of ideas around which the discussion was based, rather than a fixed set of questions. The student teachers interviewed were asked to briefly summarise their Internet experience during the research and then to talk about what their views on the use of the Internet in schools.

The questions did not necessarily follow a set order but the following topics were covered:

- | | |
|-----------------------------------|--|
| 1. Issues of learning; | what, when, how? |
| 2. Issues of teaching; | what, when, how? |
| 3. Issues of importance; | desired levels of use; reasons? |
| 4. Issues of relevance; | curriculum, 'information age'? |
| 5. Issues of equity; | haves and have nots; gender; other issues? |
| 6. Issues of personal confidence; | current skill, current needs? |

- | | |
|--|---|
| 7. Issues of management;
8. Issues of training; | practicality, cost, risk?
what should College courses cover? |
|--|---|

Tape transcripts were returned to the student teachers for comments, queries or changes. No comments on the interview transcripts or requests for changes were received.

3.7. Data analysis

The results from the phase one profile of prior experience have been analysed graphically. Bar charts have been used to show age, gender and experience with word processing, e-mail and the Internet.

The phase two diaries of Internet use were coded according to type of use (research, browsing for educational sites, e-mail and Internet Relay Chat (subsequently called 'chat')). The number of logins for each student and each type of Internet use were tabulated. Monthly statistics on cost were used to classify the students as 'low', 'medium' or 'high' users.

The transcripts of the phase two interviews were entered into the NUD*IST computer software which is designed to facilitate analysis of qualitative data. Initial coding was according to participant, question number and interview number. After multiple readings of the transcripts (both in print and via NUD*IST) a number of key concepts and viewpoints were identified. The transcripts were coded according to these (Delamont, 1992). This allowed these concepts and viewpoints to be tracked through all of the interview data and facilitated the selection of quotations to illustrate a range of the viewpoints that were expressed. The interviews were analysed with respect to each of the research questions. For the questions on the using the Internet and the feelings associated with using the Internet, contrasts between the viewpoints of 'low', 'medium' and 'high' users have been made. When working with transcript data it was clear that some viewpoints were more commonly expressed than others, however, with a sample size of sixteen it was not considered appropriate to quantify the responses. The analysis of the qualitative transcript data attempted to draw attention to both recurrent viewpoints and contrasts and paradoxes by extensive use of direct quotations. This

analysis provided evidence which was used to discuss the issues relating to Internet use in education which were outlined in Chapters One and Two.

The phase three questionnaires on Internet use during the research were analysed using basic statistical techniques and presented as bar charts. Comparisons of skill development for using the Internet and e-mail are also presented in bar chart form, as are the results of the personal involvement inventory. Transcripts of the phase three interviews were entered into the NUD*IST software and analysed by coding with the key concepts and viewpoints that were also used in phase two.

3.8. Limitations of the methodology

In many ways this research was a compromise, particularly in choosing to exclude gathering observational data of students using the Internet. Repeated interviews with each participant (and in depth interviews with a smaller sample) did offer the possibility of the research questions being revisited. However, nearly all data collected was from the perspective of the participants. This was appropriate for most of the research questions as they asked the participants to interpret the Internet. Using only the participant perspective was not so strong when considering the question of how they used the Internet, both in terms of purpose and in more technical terms (for example, searching techniques). The trustworthiness of the research was at issue and this was reliant on the assumption that the information given by participants was reasonably honest and accurate.

The network statistics on data traffic and cost were the only other source of information on Internet usage. It was worth noting that every aspect of Internet use could be tracked by the computer system (for example, to track which Internet sites were accessed by whom). Such logs have been used to research student teacher use of the Internet over a four week course (Iseke-Barnes, 1996) but the vast amounts of data generated were only useful in validating the student teachers' descriptions of their Internet use. In the current research the decision was made to trust that the students involved would tell their stories honestly. Computer surveillance was rejected as unnecessary and possibly unethical.

The research was designed to include some aspects of participant validation. For example, the phase three questionnaire asked the participants to provide information on patterns of Internet use noted in the previous phases. There was also the possibility of participants reflecting on their interview transcripts and reconsidering their responses. However, participants have not been asked to comment on the analysis of the results.

3.9. Summary

The aims of this research project have been identified as belonging within an interpretive framework using the tradition of symbolic interactionism. The aims were to describe and analyse the experiences student teachers had in using the Internet. The choice of a case study approach was justified as an effective way of gaining an insight into the subjective experience of the participants. Questionnaires, interviews and diary sheets form multiple sources of data which were used to strengthen the reliability of the study. Triangulation of information was possible. Reasons for rejecting observational methods to collect data have been given. Ethical issues raised in the research have been dealt with systematically in the selection of the case, the sample and the proposed conduct of the research. The three phases of the research, the data analysis methods used and some limitations of the study have also been thoroughly outlined.

Chapter Four

Results

I and my colleagues have earlier argued that the likelihood that a teacher accepts a computer-related innovation into his or her practice is a function of three variables: expected payoff, level of problems that have to be overcome, and intrinsic pleasure in being involved with the innovation. (Collis, 1996a: 25)

4.1. Introduction

The results of the three phases of the study are presented below. For the first phase, data on the students' age, gender and prior experience with computers has been analysed. For the second phase, responses to each of the interview questions have been presented using quotations to illustrate the diversity of viewpoints. Internet usage patterns have been analysed using diary data, statistics for on-line costs and interview data. This analysis has revealed 'low', 'medium' and 'high' using groups. Where appropriate, the results for each of these groups are contrasted. For the third phase the results of the final questionnaire on Internet use are analysed in graphical form. Finally, the summary of the results describes the ways that skills in using the Internet and e-mail developed during the project and highlights key points about the way that the Internet was interpreted.

4.2. Results - Phase one

During phase one of the research the participants provided information about their gender, age and prior experience with computers (including the use of the Internet). These results are presented in bar chart form in sections 4.2.1 and 4.2.2 below.

4.2.1. Analysis of the gender and age of the students

Of a total of sixteen participants, there were eleven women and five men. Of the whole cohort invited to participate, five out of a total of thirteen men (38%) and eleven out of a total forty three women (26%) chose to participate. Thus the research appeared to be more appealing to men than to women. As Figure 4.1 below indicates, the majority were mature students between twenty and thirty years old.

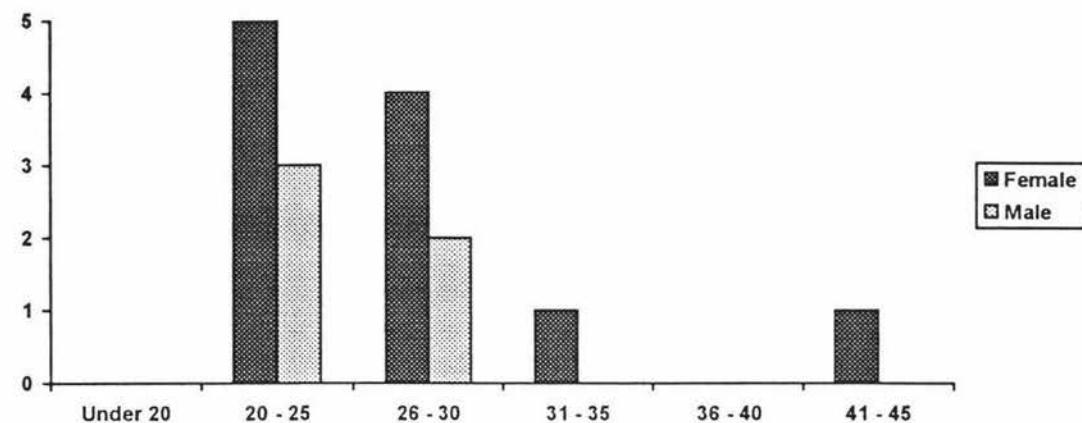


Figure 4.1 The age and sex of the students in the research project

4.2.2. Prior experience with computers

Participants were asked to indicate their level of previous experience with eight different types of software (database, spreadsheet, desk-top publishing, multimedia authoring, drawing software, wordprocessing, electronic-mail (e-mail), and using the Internet) and to indicate whether this experience (if any) was achieved in a personal/professional context and/or a classroom context (see Appendix E). Only the data for wordprocessing, e-mail and using the Internet is presented (see Figure 4.2) as very few students had any experience at all of using the other software listed in the questionnaire. Figure 4.2 shows that most of these student teachers had some experience of wordprocessing, most had no experience of using e-mail and half of the group had no experience in using the Internet.

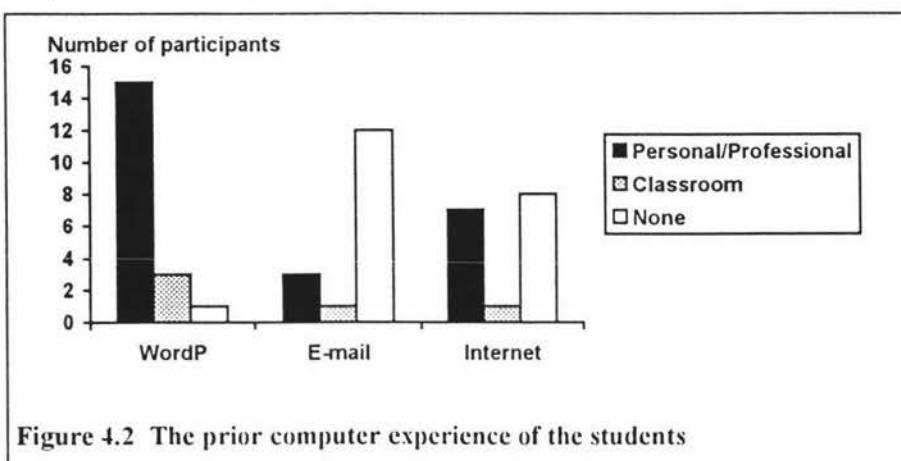


Figure 4.2 The prior computer experience of the students

Students' rating of their skills with wordprocessing, e-mail and the Internet is shown in Figure 4.3. Half the participants said they were either 'competent' or 'expert' with wordprocessing but nearly all said they were 'novices' to using e-mail and the Internet. Four out of five (80%) of the men rated themselves as 'competent' or 'experts' in wordprocessing compared to four out of eleven (36%) of the women. For those who rated themselves as Internet beginners two out of three were men. The only person who reported to be competent in using the Internet at the start of the research was male.

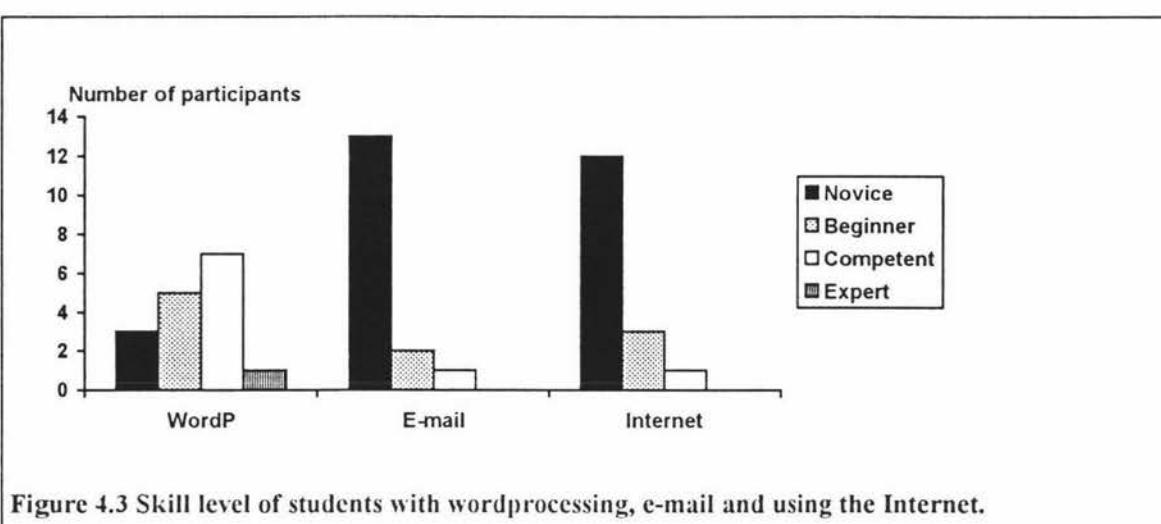


Figure 4.3 Skill level of students with wordprocessing, e-mail and using the Internet.

These students were in their second year of training but they had very little experience of using computers in classroom contexts. Eight had no experience at all in using computers in classrooms. The classroom experience of the other eight participants is shown in Table 4.1. Some had used more than one software type.

Software type	Number of students with classroom experience
Wordprocessing	3
Database	3
Spreadsheet	2
Desktop publishing	4
Multimedia authoring	4
Drawing	2
E-mail	1
Internet	2

Table 4.1 Classroom experience with computer software

4.2.3. Summary of phase one results

Participation in the research seemed to attract men more strongly than women. In general, the men who participated had stronger basic skills in using computers. Only one student rated himself as competent with e-mail or the Internet at the start. The student teachers who participated in this research had gained little formal experience in the classroom use of computers during their first year of training. However, four out of five (80%) of the men reported to have some classroom experience compared to four out of the eleven (36%) women. Overall, most participants said they were Internet ‘novices’.

4.3. Results - Phase two

During phase two of the research the students were interviewed twice about their Internet experiences: once at the beginning of the research (in early April) and again after three months (at the end of June/beginning of July). In the presentation of the results below the responses to the questions are illustrated using quotations from the transcripts.

In the quotations below the first number refers to the interview number (1 or 2), the letter of the alphabet indicates a particular student and the following number/s refer to the ‘text units’ used by the NUD*IST software. For example, [1A, 35-37] is interview one with student A and quoting text units 35 to 37. The alphabetic letters associated with particular students were randomly assigned to protect anonymity.

There was diversity in the way that the questions were answered and the report below attempts to maintain that diversity rather than oversimplify what was said. The results have been presented in the same order as the research questions listed in Chapter 3.3. The descriptions that the student teachers gave of the Internet are followed by an analysis of their use of the Internet during the study. Their feelings about this use are outlined, followed by the problems that they referred to. Finally, their interpretations of the Internet for children’s learning, for teaching and the future of education are presented.

4.3.1. Students' descriptions of the Internet

The first interview question asked the student teachers to describe the Internet. One approach to this involved a description of the content of the Internet. All of the participants mentioned the Internet as a source of information and everyone made some mention of accessing information in both interviews. The metaphors of a library, an encyclopedia and a supermarket were all used. In some cases the Internet was also described as a tool for communication. Another approach to describing the Internet involved attempts to define what 'it' actually 'is' - usually with reference to a technical description of how it works. Some examples of the range of the students' descriptions of the Internet are presented below.

4.3.1.1. The content of the Internet

Where the descriptions of the Internet focussed on its content, the students emphasised the Internet as a source of information, particularly 'up-to-date information', from around the world. The Internet was also described in terms of its speed. These three responses are examples:

I kind of figure that it's going to be this amazing thing that's going to give me all this information [1G, 42]

An up to the minute library of world wide information. [1O, 20]

It's getting information very, very quickly from all around the world. [1P, 34]

In some cases communication was described alongside information, for example:

As an area, or something, that holds vast amounts of recent, up-to-date information that people have access to is what I perceive the Internet as. The modern or latest form of communication I guess. [1F, 16-18]

The metaphor of a library was used to describe the Internet, for example:

I think I'd probably call it, it's like a huge computerised library system really. [1J, 16]

A huge, massive library which I don't know how to control yet. [1B, 17]

However, it was noted that unlike a traditional library there was a lack of editorial control of web based information and that the Internet user had to be discriminating. One student put it this way:

But by the same token, I guess much of the stuff that arrives in a library has been vetted and edited and approved for publication, so I would say that there is a lot of discrimination required to use the Internet. [1O, 19-20]

Another metaphor used was that of an encyclopedia. For the student quoted below, the possibility of interactivity was used to distinguish the Internet from a traditional encyclopedia:

I think to me, really, it's like an encyclopedia in some ways but also its one where you interact with the writers. But also it's not an encyclopedia so much necessarily, as the fact that you're getting all sorts of people, not just the so called experts, writing it so you'd probably have to be a bit wary sometimes of the information you do receive but, its more like an interactive encyclopedia with the writer. [1A, 18-22]

The analogy with a supermarket was also mentioned:

It's almost like a massive supermarket. Somewhere where every single thing you can think of. It reminds me of big shops, big multistores in America where you could buy every single thing you could want. [1C, 21-24]

The examples above use words like 'vast', 'huge' and 'massive' to describe scale of the Internet.

4.3.1.2. How the Internet works

When asked to describe the Internet, some students interpreted the question as requiring a description of what 'it' really 'is' and they attempted to provide a technical description of how the Internet works. Three examples of this approach are quoted below:

It's something that comes onto the computer screen but I wouldn't have a clue as to what its physically made of. I don't know if it travels via satellite or via cable.... I don't quite see it as a life form. I know what the information is, but I don't know what the structure is that holds that information. [1H, 22-30]

Not being a computer buff I don't know. I just imagine it as all these links. It's all this information sort of floating about. Each sort of computer allows you to access these little bits sort of like a big web. I find it hard to describe because I have to visualise it as something concrete. Because I can't get my head around it. Its just so big. Just having the access I've had to it, it's amazing that there's just so much information and it's a really powerful tool for learning and things. I find it hard to describe though. [1D, 22-33]

Well, at the moment it seems pretty huge to me. It's rapidly expanding...It's mind blowing. So, I'd describe it as an enormous directory really. A web linking pieces of information together and tracing them along pathways. It's hard to fathom the size of that web. [1K, 17-19]

All of the descriptions above focus on the way the information on the Internet is organised. Another student focused on how the Internet works for communication:

My understanding is there are a lot of big computers all around the world with telecommunications. You have these providers and they provide some sort of mechanism for you to manoeuvre around the communication network. [1L, 18-20]

When students have attempted to describe how the Internet works they have also emphasised its size.

4.3.2. How the Internet was used by the students

During phase two of the research, information about Internet use was gained from three sources. These were the diaries kept by the students, statistics on monthly data traffic and cost for each student, and from comments made during the individual interviews when students were asked to describe their experience of using the Internet. The diaries were useful indicators of how the students were using the Internet but they were not accurate records of that use. Diary information on usage patterns was used to construct the final questionnaire used in phase three which attempted to quantify different uses of the Internet. Statistics on total on-line costs were used to classify the students into 'low' users (\$0 - \$20), 'medium' users (\$21 - \$89) and 'high' users (\$90 +). There were different patterns in usage for each of these groups and in the report below the results have been presented in order for 'low', 'medium' and 'high' users where appropriate.

4.3.2.1. The diary data

Diary sheets were received from thirteen of the sixteen students. A further two unnamed sheets were received, each with just one login entry. The diary information was missing for three students and all of these were very 'low' users. When network statistics on monthly costs were compared with the diary sheets, it was clear that the diaries did not show an accurate record of all that students did whilst using the Internet. However, they did indicate that the most common purposes for Internet use were for research relating to some specific aspect of teaching or learning, for more general searches for sites of educational interest, for browsing (sometimes following up on personal interests), to use e-mail and finally to use 'chat' options for immediate communication with other Internet users.

4.3.2.2. The cost of Internet use

Student use of the Internet was monitored by the network manager. The Wellington College of Education network bases usage on data traffic rather than time. Costs were calculated on the basis of \$1.60 per megabyte. Statistics for individual student use, sorted into increasing order of total cost, are presented in Table 4.2.

Student No.	Sex	April	May	June	July	Aug	Sept	Total
I	F	\$0	\$0	\$0	\$0	\$0	\$0	\$0
J	F	\$0	\$0	\$0	\$0	\$0	\$0	\$0
K	F	\$2	\$0	\$0	\$0	\$0	\$0	\$2
O	F	\$2	\$0	\$0	\$4	\$0	\$0	\$6
L	M	\$0	\$0	\$14	\$2	\$0	\$0	\$17
M	F	\$10	\$3	\$0	\$5	\$0	\$0	\$18
H	M	\$0	\$10	\$12	\$5	\$5	\$0	\$32
N	F	\$22	\$2	\$3	\$1	\$8	\$0	\$34
E	F	\$0	\$20	\$11	\$4	\$9	\$0	\$45
F	F	\$14	\$18	\$13	\$4	\$0	\$0	\$50
D	F	\$13	\$31	\$9	\$1	\$0	\$0	\$54
G	F	\$3	\$18	\$22	\$23	\$3	\$22	\$92
A	M	\$3	\$11	\$37	\$26	\$12	\$5	\$94
P	M	\$95	\$16	\$15	\$15	\$2	\$0	\$144
B	F	\$12	\$21	\$57	\$43	\$88	\$7	\$227
C	M	\$45	\$19	\$143	\$24	\$4	\$0	\$235
								\$1051

Table 4.2 Students' usage costs sorted into increasing order of total cost

For the purpose of analysis of the interview data, the total costs have been used to classify the students into 'low' users (\$0 - \$20), 'medium' users (\$21 - \$89) and 'high' users (\$90 +). There were six 'low' users (five women and one man), five 'medium' users (four women and one man), and five 'high' users (two women and three men). From these figures, 20% of the women and 60% of the men were 'high' users. The total cost over six months was \$1051.

4.3.2.3. Descriptions of Internet use

The Internet was used to search for information, become familiar with educational sites, browse web sites, communicate with e-mail, and 'chat'. The results indicated that 'low' users tended to choose not to use the Internet and could say why they did not use it, 'medium' users tended to find the Internet useful for their work as teachers and 'high' users tended to use the Internet for both research and to 'chat'.

There were six 'low' users. 'Low' users tended to describe their use of the Internet as time consuming as shown by these three comments:

I found just with browsing; if you didn't know what you were specifically looking for, and again, it's not through my experience but talking with other people, if you've actually got a definite address then it's a lot quicker. But it can be a big time waster. [1J, 48-51]

I spent an hour on it yesterday, just browsing really. If I wanted something quickly I can imagine that it might not be a quick process at the moment. [1K, 53-54]

Probably I just need to have more practise at digging around. It's quite time consuming isn't it, and its easy to get off on a tangent. I didn't know about the back button for a while there and that was confusing. Yes, you have to be really focussed on what you're looking for, you can just browse for hours. [2O, 102-105]

The last comment above indicates that for some 'low' users their lack of skill with some basic techniques caused difficulties. 'Low' using participants in this study generally chose not to 'waste' their independent study time browsing the Internet. Some students who participated in this study subsequently enrolled in an optional course which used the

Internet. One 'low' user made this comment contrasting 'wasting' personal time with 'wasting' course time :

I have tried it now, briefly and to be honest I'm dissatisfied so far, but I can see that if I had one myself and I had my favourite sites I'd use it. I do know people in similar positions to me who did that course with M and they said to have that dedicated two hours, they searched and played and they said it was frustrating at first. You could really waste a lot of time but you were there doing the course anyway. That was useful to them and to be honest I wouldn't have minded doing that course. It would have made me use it, made me waste the time, quick and easy, but when its your own time its too valuable. I'm not one for sitting down unless it's something I'm really enjoying. [2L, 51-59]

'Low' users tended to choose research methods that felt comfortable with, especially when they were under pressure. This comment is an example of how a 'low' user made the judgement about whether or not to use the Internet:

I think the unfamiliarity with it has affected whether I've chosen to go and look at it for research for my own study because we've got these six week courses. The deadlines come up so quickly that it's a time pressures context, so I resort to more familiar sources of information like the library, where I just know exactly where to go to look up a reference and check out the information. I don't have the solid, long amount of time to do research. I think I could go and look up some information on the Internet and I have talked to some people who've said you do have to spend time sifting through things and that has been my own experience; that it's a matter of moving onto something; you might not do what you want in the end. It's not like having a guarantee that what I want will actually be there.
[2K, 34-42]

Only one of the 'low' users had used e-mail. They said the following:

Well, I have been using the e-mail a little bit and I'm finding that that's a wonderful way of communicating, so quickly too, with people all around the world. That's a real highlight I think. [2M, 23-25]

It appeared that the other 'low' users did not have any personal e-mail contacts. For example, one said:

I guess the main problem; I guess I'd quite like to use e-mail but I haven't had any prior experience of using it so it would take a bit of effort on my part to actually give it a go and talk to some other people which I haven't done. [2I, 70-72]

It also appeared that 'low' users were generally not attracted to 'chat' as this comment indicates:

There's another thing as well, the idea of talking to someone on a gossip line. For me, it might be my cynical old fashioned ways but I think it's a waste of time. They seem quite sad. I wasn't very impressed with it. I like personal; the thought of sitting at a computer screen and communicating with someone is beyond me, especially when you don't know who they are. I find it bizarre and it's been so popular. A lot of my friends have been doing it. [2L, 36-43]

There were five 'medium' users. 'Medium' users tended to emphasise that they found the Internet a useful source of information as indicated by the following comments:

In the main bit, I've used it quite a bit for finding out information for assignments and its been quite useful. It's been good. [2N, 9-17]

Now that I've bookmarked different sites that I've found useful, especially those ones that list educational places that you can go to; a site within a site. I might spend just on this one page and going into each one, finding out the different things in there. I've just got so much information that I've found really useful. [2D, 9-12]

Where 'medium' users had e-mail contacts they were positive about using e-mail. For example:

E-mail is really neat. [2H, 39]

Generally, 'medium' users tended not to make much use of 'chat' options. For example, one commented:

You get frustrated but overall I enjoy it. I still haven't been into any of these chat rooms that lots of the other people are doing. I just had a look and I didn't find it very appealing. But I guess everybody enjoys different aspects. [2E, 106-109]

There were five 'high' users and they tended to be much more confident about their abilities to find specific information. For example, two of the 'high' users made the following comments:

I know where to go, I know how to get stuff, I know how to print stuff off, I know how to search a concept, search a question, search someone's name, find news from different

countries, look up weather, look up even just the initials of something. It still comes up with all these different places, different other things to do with that. It's great. [2G, 10-14]

I know how to search for things now and I've got pretty good handle on that; I've worked out which search engines to use and which not to use. [2C, 9-10]

'High' users also tended to become aware of more of the possibilities offered by the Internet. For example, this 'high' user discovered possibility of working *with* other teachers:

And, also, just looking at today, getting into the education sites specifically. That was really interesting, they have units and you can get ideas off other people so you can sort of work together with other teachers. [1A, 74-76]

Finally, all 'high' users tended to make use of Internet 'chat'. For example, they said:

I think the idea of having a connection to someone over the other side of the world is really exciting. It'd be great for the kids. I've really enjoyed it. Chatting to people and finding out a lot of things. [2A, 86-87]

I've had a look at chatting and I find that quite frustrating because I've chatted to a couple of interesting people but by and large its been a lot of kids, kids with nothing better to do. And, there's a lot of quite crude people on there as well. You really wonder who's typing the stuff that comes out of there sometimes and that's like the Internet itself; you have to wade through a lot of stuff before you get what actually you want. You have to be prepared to take the time to do it. [2C, 74-79]

Don't believe anything that any of them say. I think you just have to be sceptical when you chat to them. And I've got two chatting identities now...I think you tend to write stuff or say stuff or whatever that you wouldn't normally say when you first meet somebody. And you can have them on. Like I have had somebody on once and I felt a bit guilty about that, but in the end I just didn't want to chat to them any more. I ignored them. It was good. And even, it was really sad. [2B, 69-92]

Overall, the use of 'chat' mainly by 'high' users, tended to be recreational rather than professional and was carried out despite having signed the acceptable use policy which specifically stated that Internet use was to be for professional purposes only.

4.3.3. How students felt about their Internet use

These student teachers expressed a wide range of different feelings about using the Internet and in some cases these feelings did change as the study progressed. In this section a summary of the feelings expressed at the beginning of the study are presented. Then some examples of the feelings expressed in the second interview are presented in order for 'low', 'medium' and 'high' users.

At the beginning of the study the students expressed many positive feelings about using the Internet. For example they used the words 'amazing', 'interesting', 'enjoyable' and 'fun'. The feeling of excitement was also expressed, for example:

Excited. I haven't use it before and I have been looking forward to it all Easter weekend thinking I want to come in and play with the computers. I want to explore it as much as I can. [1B, 6-9]

But I feel quite excited about it because its really up-to-date; the currentness of it is cool. [1H, 11]

Kind of excited about using it but really a bit wary that I'm going to muck it up or go somewhere that I shouldn't go or get really lost on it. [1G, 5-6]

As far as finding my way around the Internet, I'm going a bit blind so it is sort of an exciting new adventure. [1A, 12-13]

Others expressed interest and curiosity, for example:

Kind of interested because so much is talked about the Internet... I'm interested but I'm a bit sceptical. [1L, 5-13]

Well I've only used it about three times at College because I don't have my own computer and I just wonder what all the hype's about. I've heard so much about it.... [1D, 5-7]

There were also expressions of fears about using the Internet. For example the words 'scary', 'unsure', 'uncertain', 'worried' and 'frustrating' were used in relation to concerns about getting 'lost' and 'wasting' time. This comment is an example of how these initial feelings were expressed:

It's very daunting. I have this anticipation that I'm not going to be able to do it because my computer literacy is zip...So, I'm going in with trepidation but I would really like to be able to use it. I expect it to be hard. [10, 5-14]

Students were interviewed again after three months. By this time there was evidence of 'low', 'medium' and 'high' Internet usage groups. Generally, 'low' users tended to express disappointment in the second interview, 'medium' users were positive about their Internet use and though they acknowledged some of the frustrations they experienced they had found ways of coping with these. 'High' users still tended to express excitement, especially when talking about using Internet 'chat'. Examples of comments reflecting these feelings are given below.

The disappointment typical of 'low' users is expressed in the following comment:

At this stage I'm actually feeling a little bit disappointed. Still finding it overwhelming but problems with actually finding what I want on there. Like some of the stuff that's on the net, its difficult to tell if its well researched so that's kind of where I am at the moment. I haven't used it really; I wanted to use it for some of my assignments and haven't found anything to really support what I'm doing. I just haven't really had a need to use it so I haven't...If I can find information more easily in a book or something like that, that would be my first choice.[21, 8-24]

However, another 'low' user was positive about feeling more confident, despite her low use, as shown in this comment:

I haven't put the time into it that I intended to or wanted to but I don't find it as frustrating. I feel much more confident now. I think its definitely something that would occur to me if I wanted to know something, it would be one of the first places I would look. Previously I wouldn't have. [20, 75-80]

'Medium' users tended to have found the Internet useful as an information source and also tended to express positive feelings. For example:

I've just got so much information that I've found really useful....I think its really great; I love going on it now. [2D, 12-18]

You go to the library and the books are 1967 or 1970, but if you want something that's up-to-date and there, it's the Internet. I love it. [2F, 31-33]

The confidence felt by 'medium' users, despite the difficulties they experienced, are expressed in these two comments:

I don't feel hesitant about using it any more. I feel quite confident in my ability to use it so that's quite good. In terms of wasting time I think you still do in terms of, it takes time to get to connections and sometimes those connections haven't been set up properly, when you're using search engines or trying to look through things. So, therefore that still is frustrating for me but I've learnt to cope with it. This is going to take a few seconds so you've just got to wait for it and sometimes getting into sites and finding nothing there. [2N, 9-17]

By now, probably a bit more cynical about it. It's still interesting. You can get lost, but yea, there's a lot of stuff on there that you don't really want that you have to get past to find something that you really need. I'm not so unsure now; more confident. [2E, 8-12]

The 'high' using group tended to have expressed initial excitement and continued to find their Internet experience exciting, particularly because they found 'chat' exciting. These two comments express these feelings:

Still excited. Especially cause I've been chatting. I don't know whether we're supposed to or not but I've really, really like doing that. It's been very positive although I've had a few interesting people to chat to. It's really good. And also just looking up stuff using the Internet. I feel really confident in using it and I feel much more confident in using computers since I've started doing this. Since I've started spending more time on them and feeling really good. [2B, 11-19]

I think one good thing about it and why people return to it is because you're not feeling threatened by the physical vicinity. They're not right there. You can open up these

inhibitions that you have and you can just talk freely. It is amazing how much even I've noticed myself open up and talk about things that I may not necessarily talk with people that I'm talking to about in more everyday life. I think its probably quite a good therapeutic thing as well. You sort of get things off your chest that you've bottled up and never talked about. Cause it doesn't really matter; this is a person you've never met before and may never meet them in your life. It's really good in that respect. It's definitely exciting and new. [2A, 98-109]

Another 'high' user enjoyed the speedy access to simulations of the outside world:

The attraction of doing it this way is that its so quick; you don't even have to leave the building. You just go to another room and here you are in the Tate gallery or somewhere without even going on a plane. Its incredible, its great, I love it. But I still aspire to go to the Tate gallery. [2G, 138-142]

Overall, the students who were most positive were those who spent more time using the Internet. Much of the enjoyment expressed by 'high' users seemed to be associated with communication through e-mail and 'chat', that is, the more recreational options available. 'Medium' users tended to be those who really did find the experience useful, particularly for finding information for teaching or assignments. 'Low' users were still interested in what the Internet had to offer, but were more likely to feel disappointment at the end of the study.

4.3.4. Problems experienced by the students

The major problem experienced by students during this research was that of finding information on the Internet without getting 'lost' or 'wasting time'. Some examples of the comments made on the time consuming nature of Internet use are given below. This section also summarises a number of the more technical problems that arose during the research. These include some problems with misunderstanding some of the basics about how to use Netscape software, problems with printing, problems with logging into the network login and access speed.

4.3.4.1. Problems in searching the Internet

Most of the students in this study began as ‘novices’ in using the Internet. It was necessary to demonstrate the use of Internet search engines to some students and after this they were able to work independently. However, from the interviews it appears that students did not always understand how search engines worked or how to use advanced techniques for searching. The searching process was also found to be time consuming. The comments below from student N, show an example of how growing experience meant that the problem of ‘wasting time’ was reduced, but that there were still problems in understanding how search engines used keywords:

I suppose I’ve used, what are they called, the engines. So, I’ve used search engines but I suppose its just experience in terms of using it, of actually finding out ways of accessing the information that you want to get out of it. So, I think you can waste a lot of time on it, just playing around and trying to get to where you want to go to. I suppose that’s the only way to get competent, to play around with it but I’m one of these people, I want to know exactly where I’m going and where its going to get me instead of having to rummage in lots of different places. [1N, 44-51]

In the second interview she said:

I think that’s probably changed as well in terms of, if you are quite specific in what you are searching for then you don’t rummage as much. But even today. I put Amazon Forest and education and it still gave me this whole heap of rubbish. I don’t understand how it managed to find Amazon Forest in there, but somehow those sites were connected to those key words. That was a pain. If you’re quite specific about what you’re looking for you only get a few sites anyway. [2N, 107-117]

It appeared that students did try to understand how the retrieval process worked. This comment shows one student’s thinking:

It’s been quite frustrating at times too, ‘cause you call something up and you just get zillions of things, so the only qualifiers seem to be: match any word or match all words so I actually was told you can put an AND in capitals between words. [1E, 36-38]

There was evidence to suggest that the point and click interface was seen as being ‘easy’ to use but the overall information retrieval system was not so easy to make sense of. For example, one student made this comment:

In some ways I think it feels quite overwhelming because its quite a lot of information and its quite difficult to figure out what you want and you can waste a lot of time. But also, I don't find it difficult to use. I've used it a couple of times and its easy enough to find your way around. [II 6-9]

This comment highlights the need for Internet users to be clear about what they are trying to find in order to avoid wasting time. Finally, there was evidence that sometimes when the student teachers found the information they were looking for, they experienced the problem of having to pay for it. For example, one student said:

I was an occupational therapist before and I wanted to look at motor patterns in reading and I got a long list of web sites from the association but when I got there, almost invariably they gave a brief summary and then if you want to know more it will cost you \$12 or something. That's really frustrating. [2O, 21-24]

4.3.4.2. Technical problems

Given that many of these students were relative beginners to both the use of computers and the Internet, and that they had no formal support, they reported very few problems. In some cases students needed some basic information about the use of Netscape in order to be able to make a start. This was the case for the student who did not realise that it was necessary to press the return key after entering an Internet address or URL. Unfamiliar terminology also caused some problems. For example, the acceptable use policy did not allow downloading software and one student was not sure what that meant:

And, I'm not sure what some of the terminology means. Like, what does downloading mean? Does that mean so I can get to see a bit of information or is that something I'm not supposed to do. [1K, 67-77]

Problems with printing were reported by some students. This was not unexpected as difficulties with printing pages which include frames, tables and cgi scripts from Netscape 3.0 are documented on-line on the Internet.

The student network at Wellington College of Education was organised to support access by identified groups rather than individuals. The students in this study were the first in the College to have individual login identifications and their experience provided

an insight into some typical problems. For a small number of students there were difficulties with the creation of their logins and they had ongoing difficulties logging in. In this circumstance they had to be very persistent in trying to get the problem fixed and in the meantime they used other people's logins. Often students did not log off properly and later found that they could not log on again. Consequently they too used someone else's login and the problem escalated. It was easy for students to use each others logins as the password was set in a standard way which others could easily guess.

There was an associated problem with the way Netscape was set up on the network. When students bookmarked sites they could only retrieve the bookmarks if they returned to the particular computer they used when they created the bookmark. This meant that lots of students were bookmarking popular sites on many different computers in the suite. However, they did not get the benefit of their own personalised list of preferred sites.

Most of the students mentioned that using the Internet took a lot of time, and in some cases they specifically mentioned that they found the response time 'long', 'slow' or that it took 'ages'. For some, the time factor was a barrier to their ongoing use of the Internet and for most it was a source of frustration. There were a small number students who specifically mentioned that they would have done more if they had access to the Internet from home rather than in College. Overall, the issues that arose as problems during the research were relatively predictable and small in number.

4.3.5. The role of the Internet in children's learning

During the interviews the students were asked to think about children's learning and to describe the role of the Internet for children's learning. Students in this study identified the Internet as a source of information that children could use when the children were 'researching' for 'topics'. The availability of international information and the possibility of 'authentic' experiences tended to be stressed, for example:

I think it would be very useful just because of the availability of information and because it brings the whole world here. [1C, 74]

To realise they're not just part of a school community but there is a big wide world out there. And also, getting information from schools overseas. It brings it more into reality for them. Being able to talk to someone else. [1N, 59-62]

There was also an emphasis on using the Internet to develop skills, particularly information skills. For example, one student said:

I think its a great way to improve their skill learning. Researching information, finding out information. [1M, 65]

Another was more specific about some of the processes involved in finding information:

Sure, kids have got to go to libraries and things like that but just to be able to access that in the classroom; it's a good research; even though you have to wade through all that stuff that can be a lesson in itself. That narrowing things down, that's a skill in itself; you do that in a library; you don't go and look at every single book. You go to the catalogues and stuff like that; that's another aspect of it. [2C, 134-139]

However, some students recognised that confidence in finding information was only one aspect of the process of learning. For example, one student said:

I think it opens up an enormous amount of information for them. I think they should feel confident about finding that information but that there must be a lot of skills that you have to get across to them so that they can make good use of that stuff. [1O, 67-68]

In some cases the students were concerned about the possibility of children getting 'overwhelmed' or 'lost' on the Internet and one solution to this problem was to be very clear about what they wanted to 'know' before they began:

I think if children are given quite a lot of structure in how they get into it they won't get too lost. [1D, 78]

But I think that could be a problem as well if they don't know what they're looking for they could get completely overwhelmed. [1I, 62]

They have to be trained to really know what they are looking for. [1E, 65]

For some, the Internet was seen as a dangerous place for children, particularly due to the possibility of accessing pornographic sites, and so a carefully monitored approach was recommended. For example:

I think, if you were a teacher talking to kids about the Internet and letting them have a go and stuff, you'd really have to guide them and where they're going to go and make sure they stay there. [2G, 93-97]

Concern about safety on the Internet seemed to be more evident in the second interviews as the students were more aware of what was 'out there'. Some also became more aware of the communication possibilities that the Internet offered for children and were prepared to consider how 'chat' and e-mail might play an educational role. These comments show examples of their thinking:

Like I was saying before with the chat, you can end up in rooms where people there are not quite the sort of people that you'd want your children to be chatting with. In that respect maybe having your own private chat area where the children could go and talk with people from other schools. I'm not sure of all the things you can do with it but there must be some way you can set up a direct link or a thing that only the two schools are involved can get in to. [2A, 143-149]

I've been thinking more about e-mail and the role there, which I think could be quite stimulating. [2I, 83]

There were comments that indicated an expectation that children would like the Internet. For example, the multimedia presentation on the Internet was recognised as 'captivating' by one student:

...a lot of them are really attracted by the visual aspects of it, sounds and things like that. It captivates them. I think its a great way, particularly for kids who are perhaps who are a little slower at learning or not quite as competent with their English and their reading to actually do something like that. It will help them; it actually immerses them in it. [2M, 75-81]

Though some of the students in the research project were not convinced that the Internet was necessary in a classroom context they were still positive about other uses of computers. For example one student said:

Some schools don't have Internet access so its not going to be an issue. I wouldn't scream out for it. I've changed my mind about computers though. I was quite negative at first but

I've seen kids; they love using them, they love to publish their work on them. So, I've really turned around with computers and wordprocessing. [2L, 113-118]

Only one student mentioned that boys might be more interested than girls and expressed a desire to offer equitable access to both. A small number of students noted that publishing children's work on web pages was possible. Most students mentioned that they had no experience of working with children on the Internet.

4.3.6. The role of the Internet in teaching

The student teachers in the study were asked to think about teaching and to describe the role of the Internet in teaching. They mentioned the possibilities of using the Internet as a professional tool for researching material for classroom use, finding lesson plans and finding resources. When considering how to actually use the Internet with children, the issue of classroom management with a limited number of computers was the main concern.

Generally, the possibilities associated with the Internet as a source of professional information was acknowledged positively. As the study progressed some students became more aware of the possibilities for communicating with other teachers. For example, one commented:

I think it could be good as a professional tool for sharing information with other teachers.
[II, 67-69]

Some students saw themselves as important role models for children and acknowledged that they could demonstrate 'up-to-date' ways of working. In this comment the student teacher reflected on 'learning with the computer':

I think it's important to be up-to-date with information. And to be a model for the children. Modelling that I'm learning with the computer. [IK, 122-134]

When students thought about using the Internet in teaching, they mainly focused on difficulties in managing a situation with many children and only a few computers. This comment was typical:

I just think in reality I don't think that it would be a priority, particularly as most classrooms only have one computer so that's only one child at a time maybe with two or three surrounding them, looking on. To me, it seems like I don't know whether I would use it so much for hands on stuff for the kids. [2J, 89-101]

One suggested solution to the difficulties in managing Internet use was pragmatic rather than based on an educational rationale:

I think that in schools it would be quite difficult to use the Internet efficiently. I have most of these web sites as rewards rather than supporting teaching because you can't make it accessible all the time. [2E, 60-62]

Another student indicated that researching with the Internet might take place at home where more time was available:

I can see that being really useful but letting them loose research wise, I really don't know. You haven't got enough time in schools, unless they were going to do it at home. I think they're better off with a book or a CD ROM on a subject. You don't waste the time. [2L, 92-95]

Some were beginning to think through what might be involved in introducing children to the Internet. For example:

But I also think that one thing I would do is actually specific teaching of how to use the Internet cause I don't think its quite user friendly enough that you could just sit a kid down at the computer and say the computer will basically tell you how to run it. [2H, 85-90]

As noted in the previous section, one response to the complexities of managing children's access to the Internet was to make sure that they had specific searches to carry out.

4.3.7. The role of the Internet in the future of education

The final interview question asked the student teachers to think about the future of education and to describe the role of the Internet. They tended to recognise that the Internet would continue to grow in importance in education. They recognised a number of positive benefits that the Internet could offer for distance education and for opening up the classroom to the outside world. The value of the Internet as a source of

information was reiterated. However, some students were concerned that the Internet might 'take over' education and that all learning might be carried out through the Internet. They tended to argue against this possibility, saying that social interaction was an essential aspect of learning. Some student teachers also recognised that education is a part of the market place and suggested that the Internet needs to change to become more useful to the educational market.

The following examples indicate how the Internet was seen as having a growing impact on education through the development of workplace skills, especially on-line, interactive communication and through the provision of virtual experiences:

And perhaps that's how the workforce is gearing itself now too. People may be working with a team although they may never see them. It's those sort of skills that we're preparing kids to develop. [1O, 113-115]

It can give children access to people in other countries. Because more schools are getting computers in classrooms. I know in Britain they are. It gives a chance to have access to them on a really close link. They can talk to them on the computer and find out so much more. Develop more skills than they would just being in their classroom looking at things through books that don't interact back. Whereas, I see the Internet as being really interactive. [1D, 126-133]

It's going to play a huge role in information in giving children the help/assistance to go to another place; what's that thing called, virtual reality. That sort of thing, without actually leaving cause a lot of children won't. It'll give them that real boost or that inspiration to go further. [2F, 112-113]

Some students expressed concerns about these developments, particularly if the Internet were to become the central focus of education. These comments indicate that the social dimension of learning was seen as important:

I think I still have the concern that it may get to be too much; that they'll just stay at home and end up blobs in front of the computer. It's a worrying concept. [2A, 196-198]

Learning at home, outside the school, it would be good too, but I think in the classroom I think no, I still wouldn't make it a central focus. I think the teacher/child interaction is a

lot more important. You need to specialise in your teaching as well, in the programme you run, and the Internet can't do that. [2E, 95-100]

Sure the Internet is a great source of information but you can still get a lot of information from going to the park and going down to the local stream. I'd hate to see that, someone said that Bill Gates has this idea that everyone sits in front of a computer and they can see the great works of art, but people still want to go to Paris and see the Mona Lisa in the flesh. I think that's something we want to make sure children don't lose touch with. [2C, 187-192]

In some cases the comments indicate that the Internet should be used as a tool alongside other classroom tools. For example:

I actually think at the present time everything is Internet, Internet. There's courses everywhere and people think that, this is just my personal opinion, people think that it's this great new thing that's going to change everything. But, I actually think that as time progresses people will begin to see its limitations and see it as just one tool as part of a whole lot of things that are there. [1I, 84-88]

As far as I see it now it is another resource really. And also it can be another communication tool which probably opens up the classroom if used wisely. [1E, 93-94]

Now I see the Internet as an extra thing; not to take over, its added on. I've just changed my mind completely about it. [2G, 130-132]

The need to retain a balance in education and retain emphasise on traditional educational activities was commented on, for example:

That's quite an important part of teaching is that actually being there to support them with their needs. It's a lot easier to support them if you're actually there. [The Internet] is a wonderful resource at the same time, it's just weighting them up and finding a balance. [2A, 202-207]

I don't think you can forget about the books and that side of things just because it [the Internet] is easy to get into. We are part of a computer society and everything has to do

with computers but I think we have got to keep the importance of books in the classroom.
[IN, 97-100]

Some of the comments indicated that the impact of the Internet on education was a part of a larger social trend. For example, the commercial side of the Internet was recognised by this student who also saw that the Internet developing in the direction of entertainment:

Its all to do with money. You can see pages like the teacher's web, there's no advertising on those, they're just purely there to help. There'll always be those, mainly government funded things, but the rest of it is all money grabbing. And the majority of it is. [2P, 144-148]

Really, what they're looking into is entertainment a bit more on it. Its going to be more games. [1P, 130-131]

The comment below indicates an awareness that education could play a role in encouraging future participation in commercial activity on the Internet:

I think the more that we introduce children to the Internet technology the more confident New Zealanders in general are going to become and we may start to market our own information on the Internet. [2M, 99-101]

Some of the students commented on ways in which the Internet might develop to become more useful in the classroom. They mentioned interactive programmes and the need for Internet tools to be designed for children:

I think that will increase the amount of interactive programmes for groups that are available on the Internet. Web sites will be written and produced for that purpose. So, teaching and learning for the future. It's already been a dynamic thing. [1K, 151-155]

..if they could bring out a search engine for kids, not just for news and sports and things like that but that's down to their level and looks sort of like their level on the screen. I hope something like that will come. I think it will because to me you know the Internet is really important to education and they must be able to see there's going to be a huge market there. [1C, 130-134]

Finally, for this student commented that good access to computers was essential if the Internet was not going to just a 'fad':

At the moment I think it's maybe a fad. Unless it gets its act together and if you're going to do it seriously, you need to get good access to computers. Sharing a computer between three or four people is dodgy. [1L, 105-108]

Overall, the tone of the answers to the question of the role of the Internet in the future of education was positive as long as the Internet was used as a tool to support current educational practice.

4.3.8. Summary of phase two results

These student teachers emphasised the Internet as an information source in their descriptions. They generally described the Internet as a very large interactive library or encyclopedia. Some also mentioned the Internet as a communication tool and some attempted to describe it technically. There were three distinct patterns of Internet use. Six students were very 'low' users. These tended to be students who found Internet use to be 'time consuming' and they generally chose to carry out research using traditional resources. In some cases, 'low' users would have benefited through having more support to motivate their use of the Internet. The five 'medium' users tended to be focussed on using the Internet to support their College assignments and planning for teaching. Generally speaking, these students gained some pleasure out of their Internet use and felt successful about it. The five 'high' users were also successful in using the Internet as a professional tool. However, in every case, 'high' use was associated with an interest in participating in 'chat' as a recreational activity.

The feelings expressed about using the Internet were generally positive at the outset and for many their feelings remained positive. However, all of these student teachers had to find ways of coping with the frustrations they experienced in using the Internet, particularly that of 'wasting time' as they searched. Despite working independently with very little support, most students made progress in developing their searching skills and strategies for Internet use. There were very few technical problems experienced.

When these student teachers thought about the Internet for children's learning they tended to emphasise it as a research tool for children and argue that it was valuable as a source of up-to-date information and access to the wider world. They were concerned about the management of the Internet which was seen as a potentially dangerous place for children as they were could get 'lost' if not carefully guided. The complexity of the management of Internet use with one computer and a large class was also a matter of concern. There was an increase in recognition of the potential of the Internet for communication as the study progressed. Only a small number of the student teachers mentioned the Internet as a place to publish children's work.

When they thought about the role of the Internet in teaching these student teachers mentioned the possibilities offered for sharing resources, professional ideas, issues and concerns across the Internet. They generally recognised the potential it has as a source of information but were often sceptical about the practicalities of having to spend so much time finding what they wanted. Some thought it was important to be a role model for children and to be seen to be up-to-date. Concerns about the management of the Internet when working with children were raised again.

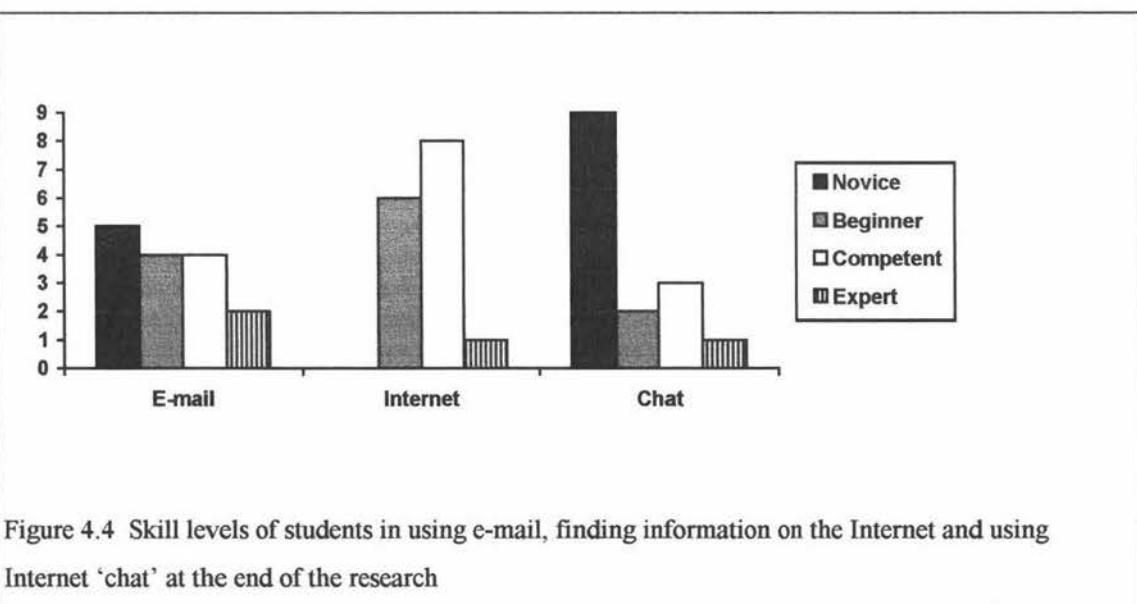
These student teachers recognised that the Internet would grow in importance in the future and that this had educational implications. When thinking about the impact that the Internet might have on the education of young children these student teachers tended to recognise the benefits that it could offer in opening up more contact with the outside world. However, some saw the possibilities offered by the Internet for children to learn in isolation, just with computers, as a cause for concern. They argued that interaction with a real teacher in a conventional classroom could provide support for learning that the Internet could not provide. Generally, these student teachers argued that the Internet should be just another tool to be used when appropriate in a conventional classroom. Some recognised that greater access to computers was needed if the Internet was to really have an impact on current practice in education.

4.4. Results - phase three

At the end of the research the students were asked to complete a questionnaire (see Appendix H) to show their current skill levels, the ways they had used the Internet during the study and their perceptions of the Internet. This questionnaire was used to provide another means of checking on patterns in Internet use and perceptions of the Internet that seemed evident in the data collected previously. Of the sixteen students participating, fifteen returned the questionnaire. In depth, semi-structured interviews were carried out for two users from the 'high' and 'medium' groups and one from the 'low' group. Analysis of the transcripts showed a repetition of the opinions and viewpoints already identified in phase two and so they have not been presented in this section.

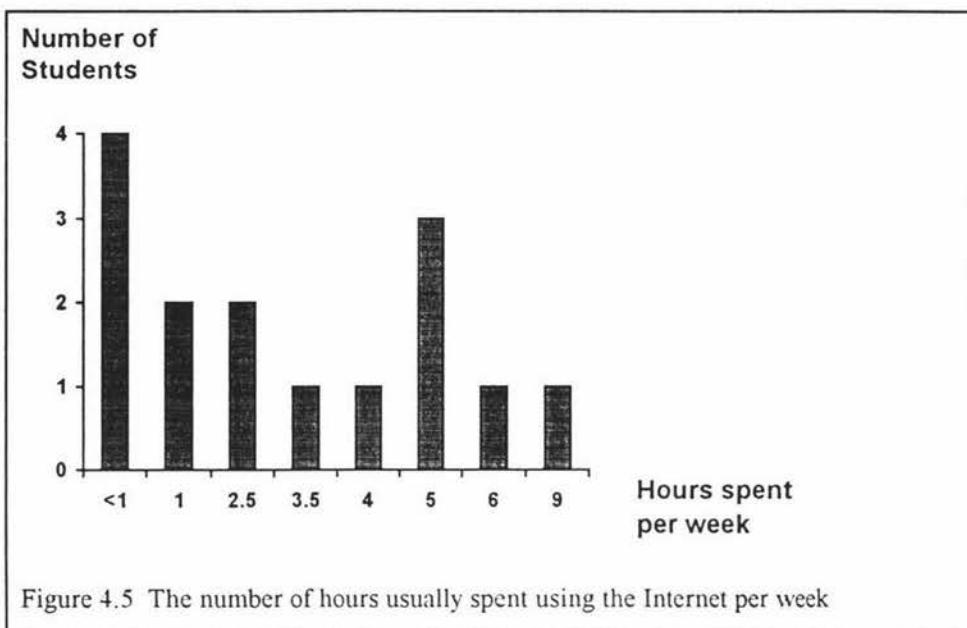
4.4.1. Skill levels at the end of the research

At the end of the research six out of fifteen students (40%) said they were still beginners at using the Internet and nine out of fifteen (60%) said they were still beginners or novices at using e-mail. Most students did not use 'chat'. Only three rated themselves as competent using 'chat' and one reported being an expert.



4.4.2. Time spent on the Internet per week

The results show that there were six 'low' users (an hour or less per week), four 'medium' users (between one and five hours per week) and five 'high' users (five hours or more per week). The pattern of 'low', 'medium' and 'high' users here was the same as for the usage statistics based on on-line costs (taking into account that one student did not answer the phase three questionnaire).



4.4.3. How Internet time has been used

The data for amount of use made of 'chat', e-mail, browsing, searching for educational sites and research is presented in Figure 4.6. 'Chat' was used 'quite a lot' or 'most' by a few (three out of the fifteen who answered). Most students (67%) did not use 'chat' at all. E-mail was used 'quite a lot' by four students (27%) with one student saying that was what they did 'most.' General browsing tended to be done 'some' of the time; no students spent 'most' of their time in this way. There were four (27%) who did very little' browsing for educational sites and seven (47%) who spent 'quite a lot' or 'most' of their time on this activity. There were four (27%) students who did 'very little' research using the Internet and the same number who spent 'most' of their time researching.

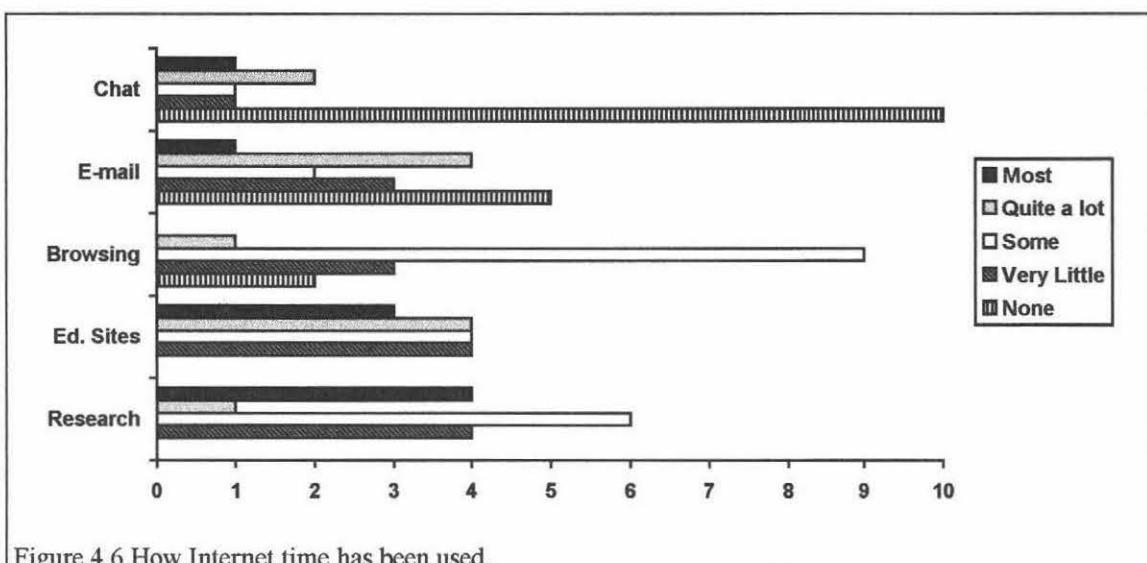


Figure 4.6 How Internet time has been used.

The final questionnaire also asked students to indicate how much time they spent recreationally. The results show that four out of fifteen (27%) spent ‘quite a lot’ or ‘most’ of their time on recreational uses. An additional six students (40%) spent some recreational time.

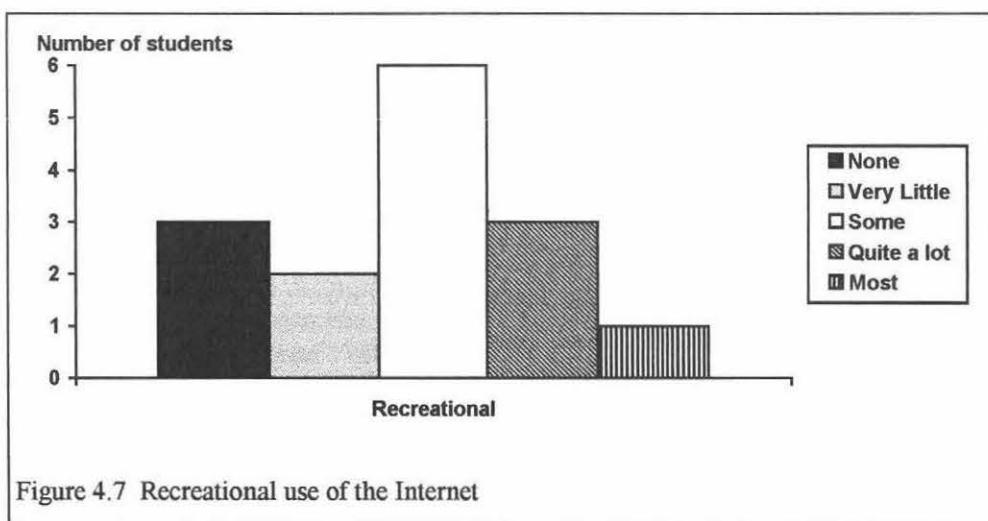
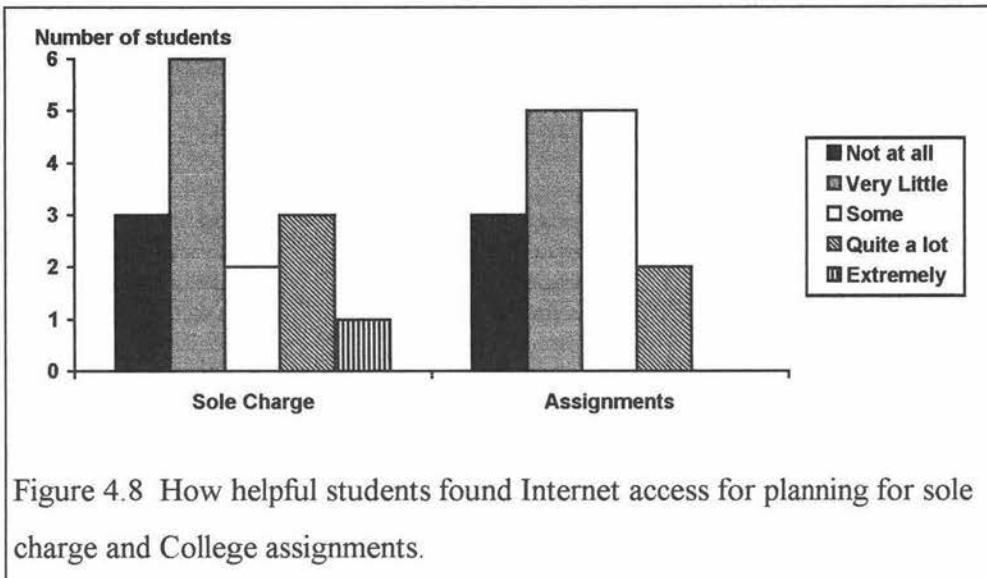
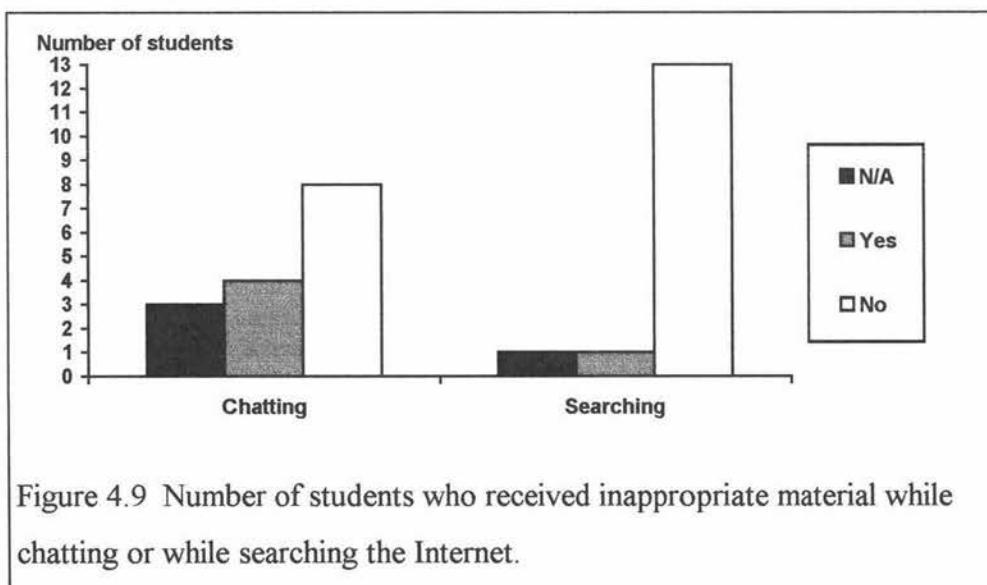


Figure 4.7 Recreational use of the Internet

Students were asked how much access to the Internet had helped with planning for sole charge teaching and with College assignments. Most students (nine of fifteen or 60%) found their Internet access to be of ‘very little’ or ‘no’ help for planning for sole charge teaching. Eight out of fifteen (53%) found their Internet access to be of ‘very little’ or ‘no’ help for College assignments.



Students had expressed concern about children finding ‘inappropriate’ material on the Internet. They were asked whether they had received any such material. Four students indicated that they had received ‘inappropriate’ material while ‘chatting’ and one had received ‘inappropriate’ material while searching.



4.4.4. Results of the personal involvement inventory

Finally, students were asked to complete a personal involvement inventory which has been developed to measure both affective and cognitive involvement in advertising using ten descriptors (Zaichkowsky, 1994). The inventory was completed for personal use and

also for children's use. The personal responses and those for children's use were almost the same. Only the results for personal involvement are presented.

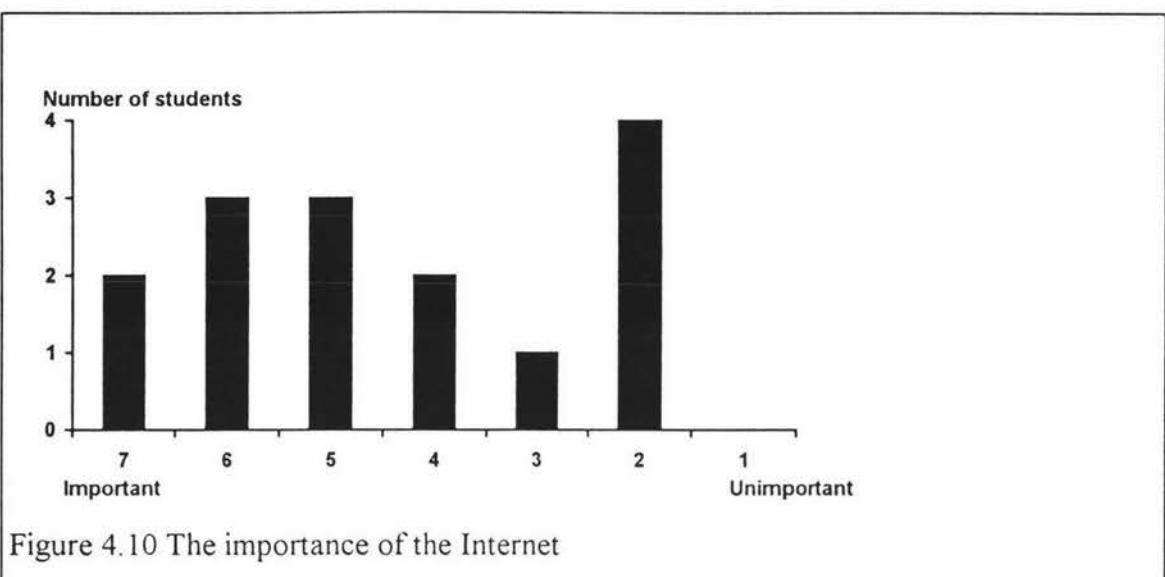


Figure 4.10 The importance of the Internet

There was a wide spread of responses for this question. Five out of fifteen (33%) rated the Internet as important (scoring from six - seven). However, four out of fifteen (27%) rated it as less important (scoring from one - two). This reflected some disagreement on the importance of the Internet.

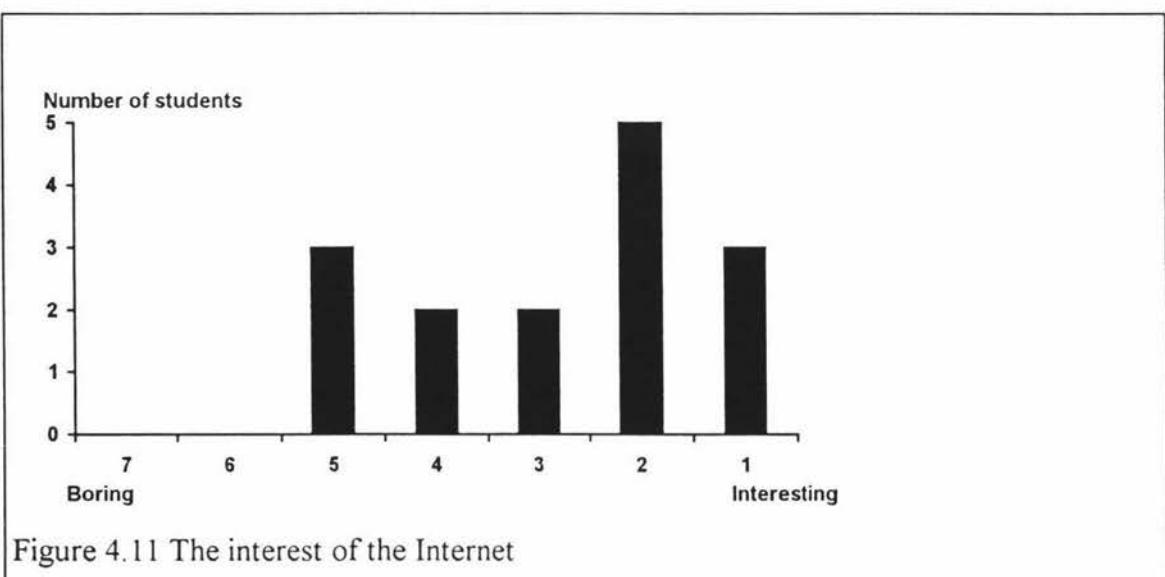


Figure 4.11 The interest of the Internet

Most students found the Internet interesting. Eight out of fifteen (53%) gave scores between one and three. No one indicated that they found it boring.

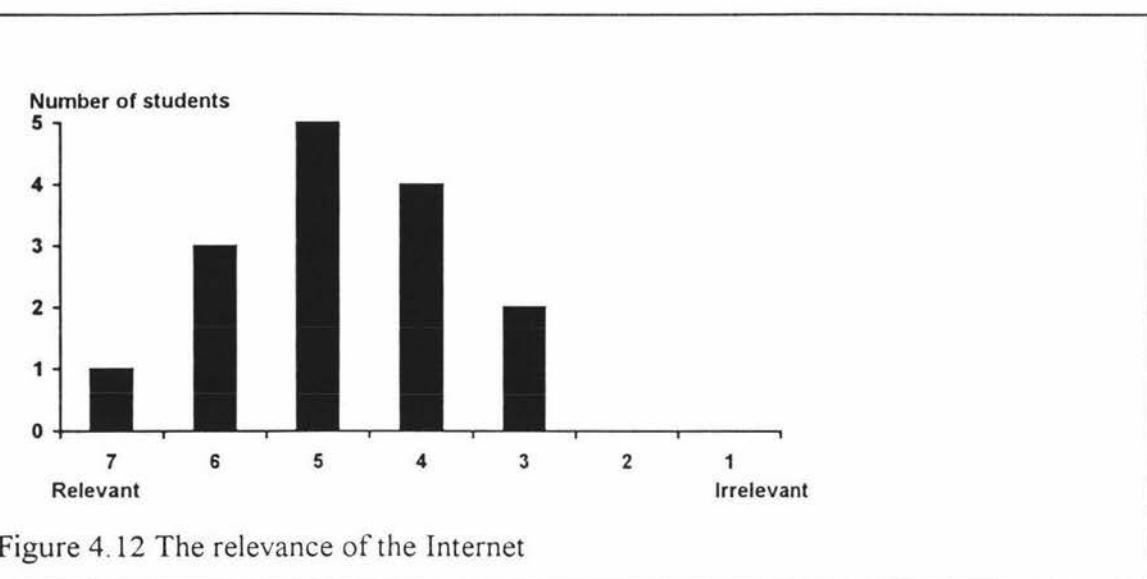


Figure 4.12 The relevance of the Internet

No students indicated that they found the Internet irrelevant. However, for this question eleven out of fifteen (73%) give mid range scores (between three and five) indicating that they were unsure about the relevance of the Internet.

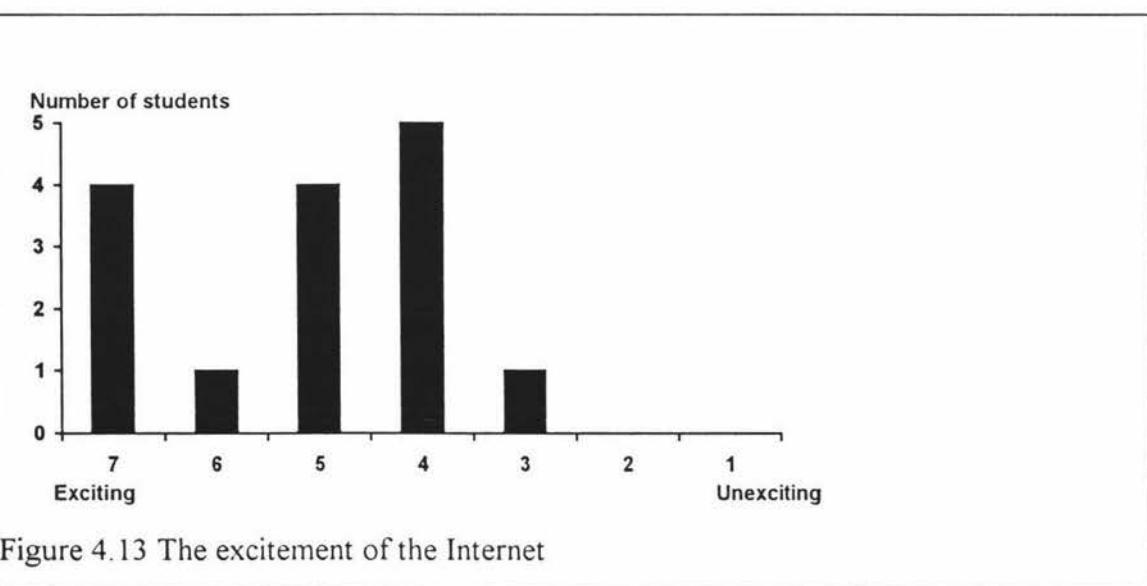


Figure 4.13 The excitement of the Internet

No students rated the Internet as unexciting. Five out of fifteen (33%) rated it as highly exciting (scoring between six and seven). The majority (66%) rated the excitement of the Internet in the middle of the scale indicating that they felt more neutral about it.

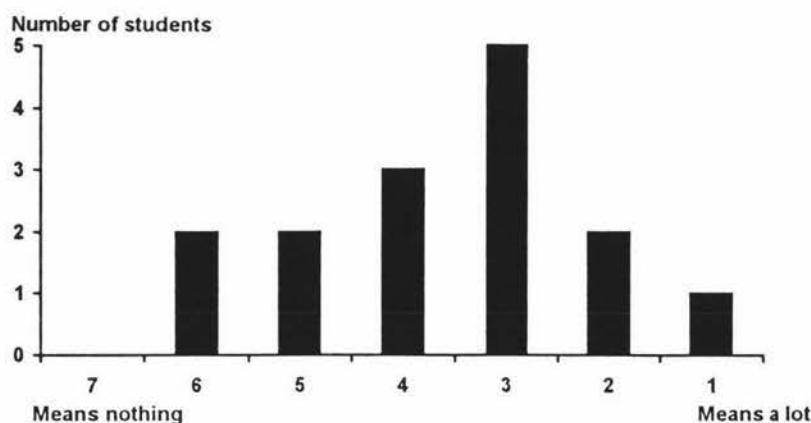


Figure 4.14 How much the Internet means

The tendency was to answer this question in the mid range with ten out of fifteen students (66%) scoring between three and five. This indicated that most students did not have strong feelings on how much the Internet meant to them. For a small number (three out of fifteen) it meant a lot.

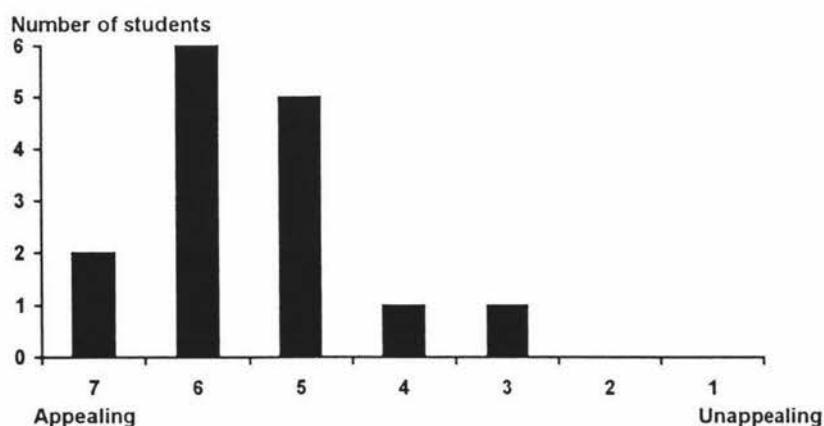


Figure 4.15 The appeal of the Internet

Most students (eight out of fifteen or 53%) found the Internet appealing and gave scores between six and seven. No one indicated that they found the Internet unappealing.

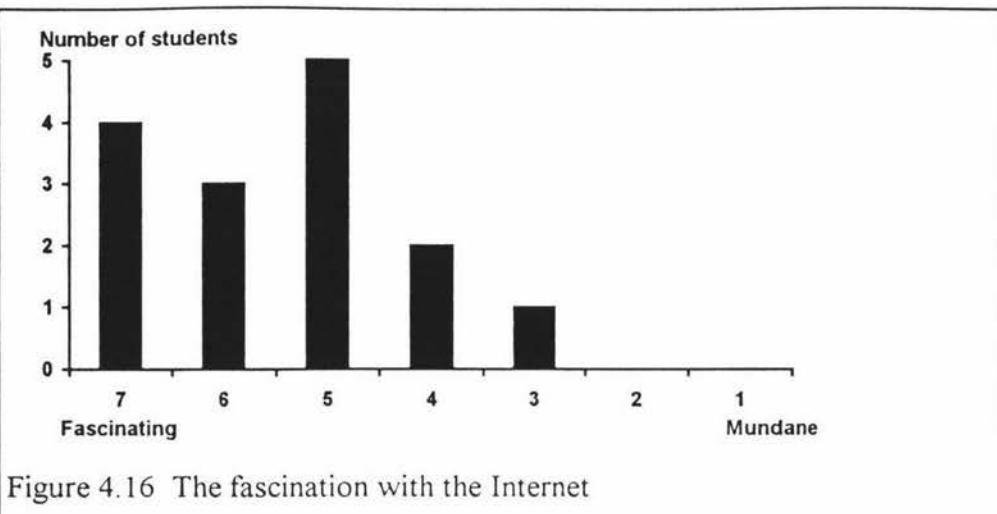


Figure 4.16 The fascination with the Internet

No students indicated that they found the Internet mundane. For seven out of fifteen (47%) it was highly fascinating as indicated by scores between six and seven.

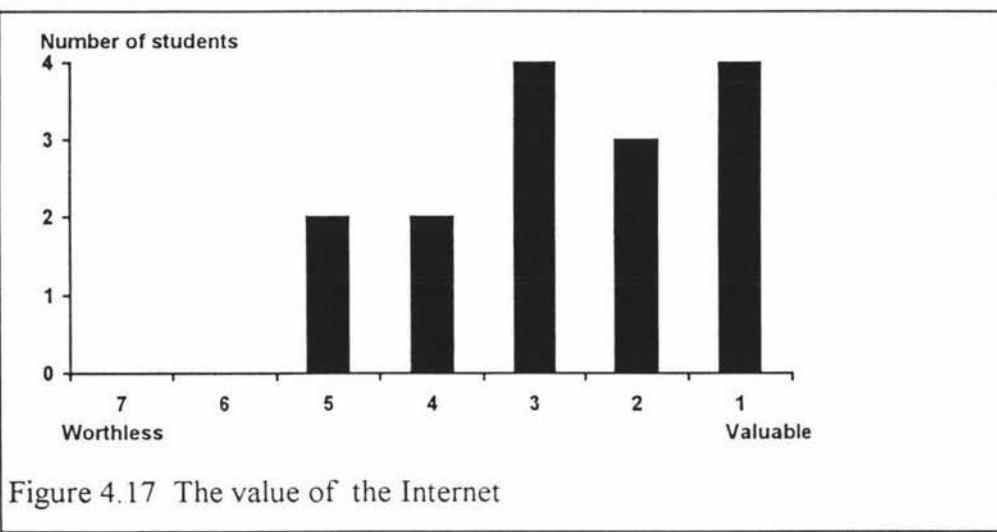


Figure 4.17 The value of the Internet

Most students (eight out of fifteen or 53%) scored between three and five for this question indicating that they were unconvinced as to the value of the Internet. However, none thought it worthless and seven out of fifteen (46%) scored it as highly valuable (between one and two).

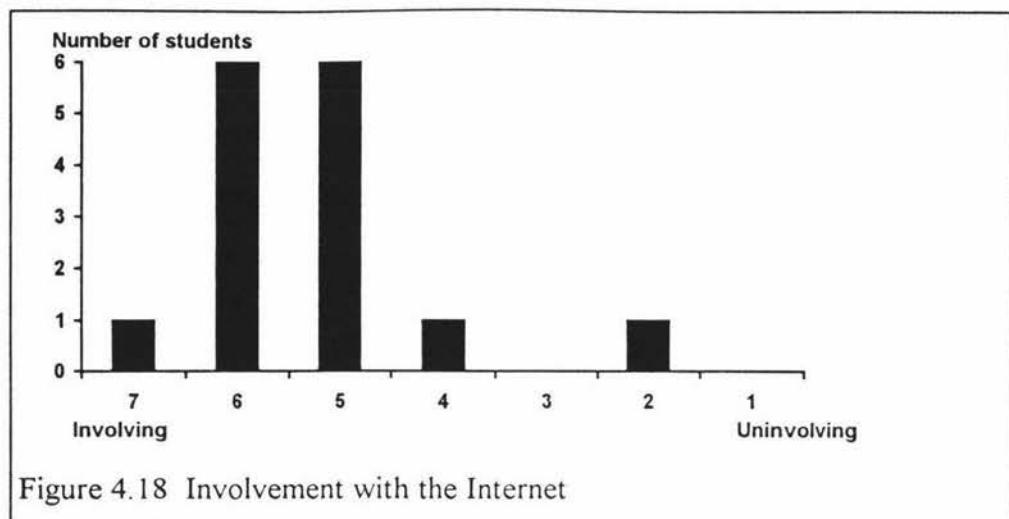


Figure 4.18 Involvement with the Internet

Seven out of fifteen (46%) scored between six and seven indicating that they found the Internet highly involving. The next largest group (six out of fifteen or 40%) scored this question with a five, indicating that they felt positive about how involving they found the Internet. Overall, most students were positive about the Internet being involving.

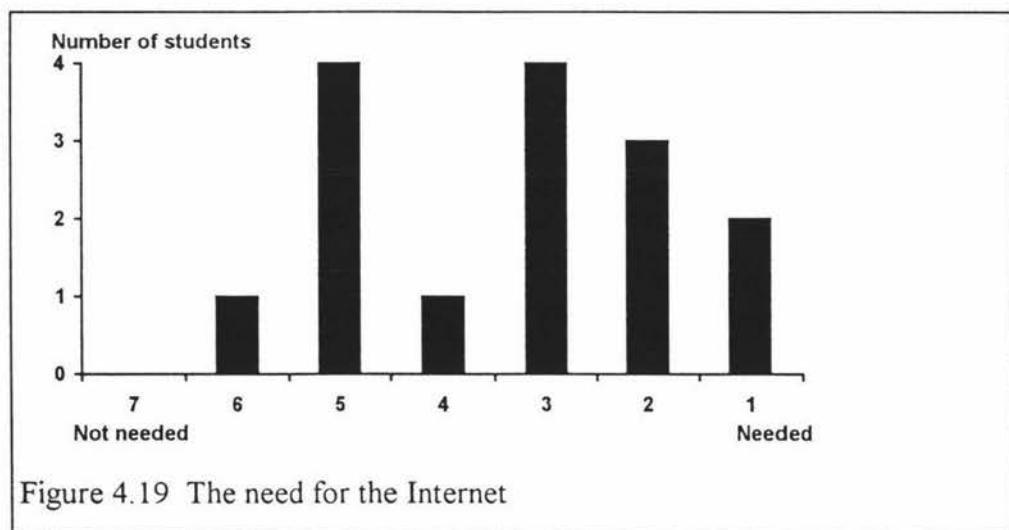


Figure 4.19 The need for the Internet

There was a range of opinion here. Five out of fifteen (33%) indicate strongly that the Internet was needed. Only one indicated that was not needed giving a score of six. Most students (nine out of fifteen or 60%) were unsure, as indicated by scores between three and five. Equal numbers (four in each case) were slightly positive or slightly negative about whether the Internet was needed.

4.4.5. Summary of phase three results

Though skills did develop through using the Internet during independent study time some of the participants still rated themselves as beginners at the end of the study. Six out of fifteen students (40%) said they were still beginners at using the Internet (there were no novices at the end) and nine out of fifteen (60%) said they were still beginners or novices at using e-mail. As outlined in the phase two results, students tended to be 'high', 'medium' or 'low' users. Most of the students used the Internet as a professional tool for research and to browse for educational resources and information. However, recreational use also took place. For four of the sixteen participants, 'quite a lot' of their time was spent recreationally. One student said that they spent most of their time recreationally. 'High' users tended to be recreational users.

Students were asked how much access to the Internet had helped for planning for sole charge teaching and for College assignments. At least 50% of the students found that access to the Internet was of 'very little' or 'no' help. This result, combined with the indication that a significant amount of Internet use is recreational, begs the question of whether or not independent Internet access for student teachers can really be justified as worthwhile.

The results from the personal involvement inventory also indicate that though these student teachers felt that the Internet was appealing, fascinating, interesting and involving many were ambivalent about the need for it, its importance, its value and its relevance. Many were also ambivalent about the Internet being exciting. For a third of the group (the 'high' users) the Internet was seen as highly exciting, meaningful, valuable, relevant and needed. The remaining two thirds of the group tended to be neutral rather than negative about these aspects of the Internet. Overall, this reflects a difference for most of these student teachers between their affective judgements (which were more positive) and their cognitive judgements (which were more negative).

4.5. Summary of the results

This summary focuses on the overall results for skill development in using the Internet and highlights key results on the interpretations that these student teachers made of the Internet.

Skills in finding information on the Internet did develop for all students during this research as shown in Figure 4.20 below. Most of the student teachers (80%) began as novices in searching the Internet. After six months of access to the Internet during independent study time, no students reported being novices. However, 40% said they were beginners at the end of the research and 53% said they were competent. One student reported being an expert. This indicates that for a significant minority, competence is unlikely to be achieved independently. The study attracted men more strongly than women but of the competent and expert users at the end, 78% (seven out of nine) were women.

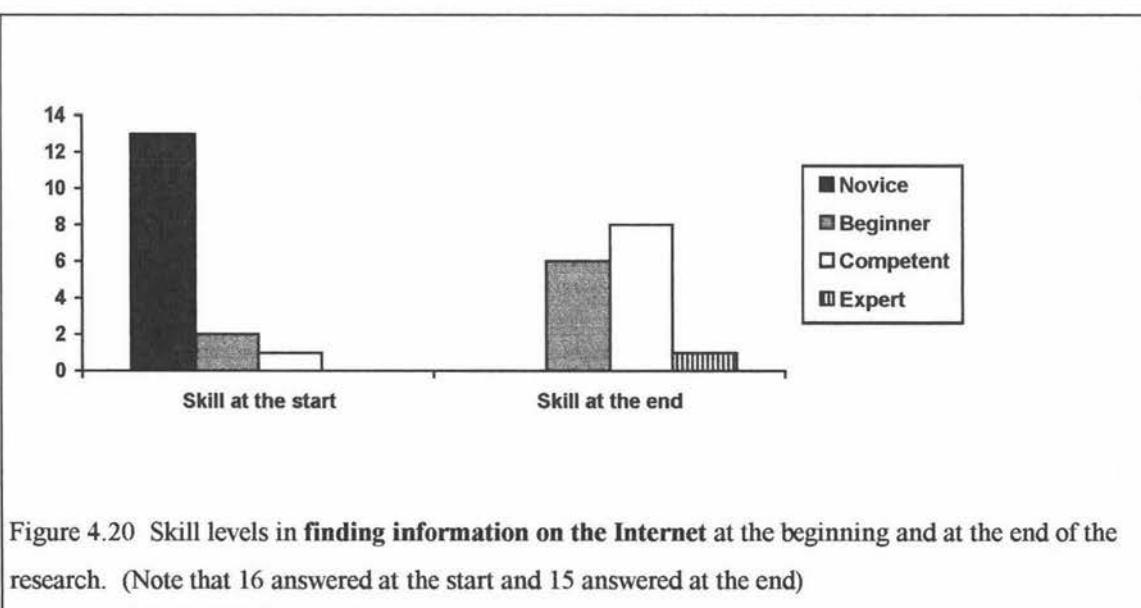


Figure 4.20 Skill levels in **finding information on the Internet** at the beginning and at the end of the research. (Note that 16 answered at the start and 15 answered at the end)

During the research the student teachers became more aware of the possibility of using the Internet for communication. However, skills in using e-mail did not appear to develop as strongly as skills in searching for information as shown in Figure 4.21.

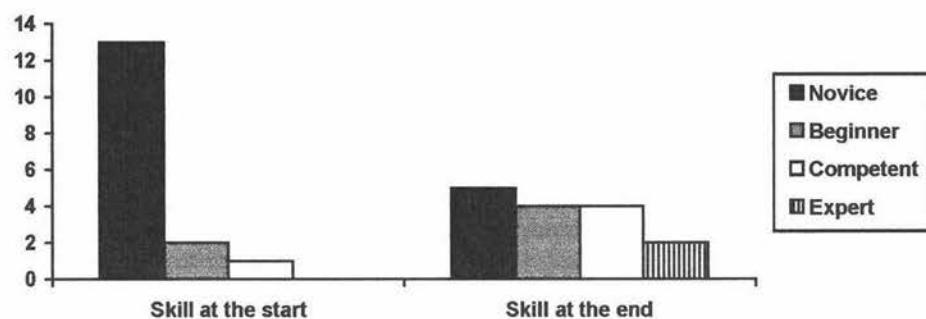


Figure 4.21 Skill levels in using e-mail at the beginning and at the end of the research. (Note that 16 answered at the start and 15 answered at the end)

E-mail tended to be used by those who had a purpose in doing so, for example, where they had family or friends with e-mail addresses. At the end of the research 30% of the participants were still novices in using e-mail and 27% reported being beginners. Of the four competent e-mail users, two were women. Of the two experts one was a man and one a woman. Access to e-mail during independent study time was insufficient for most students to become competent.

Communication was also possible through on-line ‘chat’. ‘Chat’ was used extensively by four (27%) of the participants (two men and two women) but 60% remained novices at the end of the research.

Overall, this study shows that independent access to the Internet is likely to be sufficient to develop searching skills to at least the beginners level. For roughly half of the student teachers in this study, independent access was sufficient to develop competence. With respect to e-mail, these student teachers only developed their skills when they had a purpose, particularly to contact family or friends. It needs to be recognised that the students have categorised their own skill levels and the actual meaning of ‘novice’, ‘beginner’, ‘competent’ and ‘expert’ has not been determined. With hindsight, some criteria for these skill levels would have been appropriate.

Both the phase two interviews and the phase three questionnaire provide evidence of the interpretations these student teachers made of the Internet. Whilst the interviews indicated that the Internet was generally seen as a vast information source the final questionnaire indicated that at least half of the research participants did not find Internet access useful in preparing for teaching or for assignment work. Though the potential that the Internet offered for research and communication was acknowledged, in practice, using the Internet tended to be described as 'time consuming'. These student teachers could also see potential for using the Internet with children, particularly as a research tool, however, the management of Internet access with a limited number of computers concerned them. When they thought about the role the Internet might take in the future of education these student teachers recognised that the Internet is likely to grow in importance but they tended to argue against deschooling and for face-to-face learning using the Internet as a tool.

Chapter Five

Discussion

To subject technology to interpretation involves going against the grain of the canonical rationality and technological determinism that would represent technological causality simply in terms of efficiency, physical laws and stated purposes. It means resituating thought on technology within the broader province of human values and desires. (Sofia, 1993: 40)

5.1. Introduction

As outlined in the background to this study, significant changes in the way education is organised and conceptualised are likely to result from the growing use of the Internet. The problem that underlies this study is that of the role of the Internet in education. The results of this study described some aspects of the experiences of a group of student teachers as they used the Internet in their independent time and reflected on its role in education. The literature from post-modern theorists, along with the research and theoretical work on IT (including the Internet) in education, has been used to discuss and evaluate the significance of the results.

This chapter begins with a discussion of the processes which the student teachers moved through as they learnt to use the Internet over a six month period. The results support the model outlined by Collis (1996a) where the three variables: ‘payoff’, ‘pleasure’ and ‘problems’, are significant in determining the likelihood that teachers will accept the Internet into their practice. The results indicate that pleasure in using the Internet was higher when the student teachers participated in virtual communities through on-line ‘chat’. These communities have been identified in the post-modernist literature as providing users with experiences of the “fluidity of [their] identity” (Poster, 1995: 35). Some of the implications of these results are discussed.

Next the utility of the Internet is discussed, using the results on how the Internet was conceptualised and used. The focus here is on the major problem identified in the results of this study; that using the Internet is time consuming. The discussion suggests that it

can not be assumed that strong Internet search skills will develop independently, and suggests an approach which could develop these skills. The results indicate that, in the main, the Internet was seen as a provider of information rather than as a tool for communication. This suggests that strategies for fostering students' use of the Internet for communication are needed.

The student teachers in this study were asked to consider the role of the Internet in children's learning and in teaching. Their views are discussed with reference to the literature on the use currently being made of the Internet in classrooms, and to the literature on the development of information literacy skills. When the student teachers outlined potential uses of the Internet with children, it was common for them to describe the children as 'researchers'. This viewpoint is discussed in the context of the argument for the need to resist conceptualising the Internet as a source of commodified knowledge.

Finally, the student teachers in this study were asked to consider the role of the Internet in the future of education. Here they tended to argue for integrating Internet use into current classroom practices rather than for using the Internet to transform classrooms. Overall, the results of this study are paradoxical. In the main, for these student teachers, the Internet was described as being 'amazing', but as a result of its current structure and limitations it was frequently seen as being 'time consuming' and therefore as not necessarily beneficial (for example, see the transcript of student P, Appendix J). In the discussion below it is suggested that it is necessary to introduce student teachers to the different rationales for using the Internet in education and to the ideas of the various 'information age' theorists. With knowledge of theory relating to the Internet and practical skills in using the Internet, student teachers may be able to make sense of this paradox and to participate in the debate on the role the Internet might play in transforming education.

5.2. The process of learning to use the Internet

Gaining skills in using IT and being able to implement classroom programmes which make pedagogically sound use of IT is a complex process. The literature in this area

indicates that a highly successful approach to educating teachers in the use of IT has yet to be found but it has been suggested, for example by Wild & Hodgkinson (1992) and Bigum (1990, cited in Somekh & Davis, 1997), that autonomous learning can have benefits. The results of this study indicate that providing students with free independent access to the Internet produced some benefits in terms of their development of a concept of the Internet, and in terms of their development of skills in using the Internet.

However, the benefits appeared to be greater for those who invested more time in the process of learning to use the Internet. The following section it is argued that the results of this study reflect the process described in the Collis model (1996a), that is, a process in which 'pleasure' and 'payoff' need to exceed the 'problems' experienced if a technology is to be accepted. Strategies to increase Internet usage by those who tend to be 'low' users are considered, as are issues arising from the recreational use of 'chat'.

Learning to use an unfamiliar technology typically involves working through a number of stages. Some theoretical models of these stages assume that these processes involve progressively more sophisticated use of, and enthusiasm for, a technology. For example, Harris's (1996) model of 'exploration', followed by 'discovery' and then 'promotion' seems appropriate for the 'medium' to 'high' users in this study. Many 'medium' and 'high' users did show the enthusiasm and confidence in their Internet use which Harris says is characteristic of the 'discovery' stage. 'Low' users in this study tended to stay at the 'exploratory' stage where they were testing out features of the Internet. However, the Harris model takes no account of those who test and reject (either completely or partially) a technology.

Where Internet use was tested and, at least partially, rejected, the student teachers tended to argue that it was too time consuming to use the Internet as a source of information. As outlined by Collis (1996a), the adoption of an innovation is dependent on experiencing some practical 'payoff' and/or 'pleasure' in using a technology. These aspects need to compensate for the 'problems' that are often experienced. Expert support in helping 'low' users to find information and hence increase the 'payoff' seems to be needed. This could be provided in the context of the College of Education library, which would undermine the conceptual separation of 'traditional' research and Internet

based research that was evident in some of the comments made by these student teachers. Along with a library based support system, optional tutorials on web searching could be provided for those that need them, so that basic skills are developed prior to enrolling in courses which focus on the pedagogical use of the Internet.

Those who invested the most time also tended to use the Internet recreationally as well as professionally, particularly to 'chat'. Experiences using 'chat' seemed to be significant in heightening the 'pleasure' experienced through the Internet and in some cases, 'chat' experiences seemed to be important as a way of exploring personal identity. Though the recreational use of 'chat' is outside the scope of professional use of the Internet, there are reasons for allowing it on a restricted basis. This is because it does have benefits for some in increasing the enjoyment experienced with the Internet and hence 'chat' users may be more likely to accept the Internet into their pedagogical practice (Collis, 1996a). Using 'chat' is also likely to be a significant part of the Internet culture experienced by children (Harris, 1996) and as such, an understanding of the 'chat' experience is relevant to teachers.

Communication in its broadest sense is at the heart of any educational process. Through 'chat' it is possible to explore disembodied communication in a far deeper way than with previous technology, for example, phones and faxes. The technology does the job of setting up a simulated party through the construction of 'chat rooms'. Unlike other parties, anyone can attend. The modernist assumption of a unified and coherent self are challenged by Internet 'chat' experiences: it is possible to be 'yourself', to be 'someone else' or to be 'many selves'. It is impossible to know who the other people 'really are'. These are experiences which the post-modern theorists argue will have important implications for what we understand our 'selves' to be (Poster, 1995; Turkle, 1995). Communication through 'chat' is a 'real' experience at the same time as it is a simulation of what might be possible face-to-face. Turkle captures the central point here:

Virtual communities offer a dramatic new context in which to think about human identity in the age of the Internet. They are spaces for learning about the lived meaning of a culture of simulation. Will it be a separate world where people get lost on the surfaces or will we learn how the real and the virtual can be made permeable, each having the potential for enriching and expanding the other? (Turkle, 1995: 267).

Ways in which the 'real' and the 'virtual' can complement each other are likely to be central issues for education to confront as the on-line culture grows. The possibility of breaking the usual communication conventions, particularly to allow an intimacy or honesty that is usually constrained in face-to-face relationships, seems to underlie the compelling nature of 'chat'. In education, as a minimum, the ethics of on-line communication need to be addressed. There may also be possibilities for using disembodied communication to strengthen 'real' communication. For example, situations of interpersonal conflict might be addressed through 'chat'. Disallowing 'chat' as a trivial or 'off-task' recreational activity would deny the possibility of exploring the educational potential of this emergent technology. Further research on this aspect of the Internet would be useful.

5.3. The utility of the Internet

The Internet has the potential to be useful both for information gathering and for communication. With respect to information, Internet users need to develop an understanding of the kinds of information that they are likely to be able to find on the Internet. It is also necessary to develop competence in searching for that information. With respect to communication, both e-mail and 'chat' offer options which could be useful to teachers. The results of this study indicate that even though most of these student teachers conceptualised the Internet as a vast information source, at least half of the group did not necessarily find the Internet useful as an information source for completing assignments or for planning their teaching. Many experienced difficulties in finding information and experienced problems of getting 'lost' and 'wasting time'. It was also the case that merely providing access to the communication options offered by the Internet did not necessarily result in the development of skills with e-mail or 'chat'. These results suggest that in order to progress beyond a beginners level in using the Internet, formal support, possibly through courses, is required for student teachers.

The marketing of the Internet represents it as an exciting new technology and an essential tool providing 'information' at the touch of a button. However, the results of this study indicate that these student teachers did not necessarily find the Internet useful

professionally. Over half (60%) said it was of no help or very little help for planning for 'sole charge' teaching and 53% said it was of no help or very little help for College assignments. This was despite beginning with high levels of excitement about having access to the Internet as shown in the interview comments (see Section 4.3.3.).

These results can be considered in three ways. Firstly, it could be argued that they could have found the Internet more useful if they had a clearer concept of what information was available and where they could find it. Secondly, it could be argued that lack of skill in searching the Internet increased the time taken to find information and undermined the possibility of it being useful. Thirdly, it could be argued that, at this point in time, the Internet is not a highly efficient and effective source of information. Given that it can require considerable amounts of time to find Internet based information, it may be sensible to support student teachers in developing critical and selective approaches to using it.

As noted by the student teachers in this study, the Internet is vast and ever-changing. Conceptualising the amount and nature of the information that is available is difficult. Some entrepreneurs are responding to this problem by marketing print literature providing lists of interesting Internet addresses in order to minimise searching time. In education, the recent publication of 1000 Internet sites that are relevant to the New Zealand curriculum (with monthly updates) is an example of an attempt to help teachers conceptualise what is available (Treadwell, 1997). In this case, the information is available in print form and on the Internet itself. The trend seems to be towards selecting and packaging web based information into product form, so that teachers do not need to search the whole web. Given the unwieldy nature of the Internet currently, the appeal of information products such as these for teachers is likely to be high, however, it would be contentious if these products attempted to provide easy, packaged answers to complex educational issues. It may be appropriate for these information products to be developed by the Wellington College of Education, in a form that minimises search time but leaves open the possibility of the student teachers processing the information into knowledge in some of the ways identified in the work of Bloom (1956), Gwaith (1995) and Roszak (1994) (see Sections 2.2 and 2.4.1 above).

Student teachers in this research study tended to describe the Internet as a form of 'library' or 'encyclopedia', but one which required use with a degree of 'scepticism' due to the lack of editorial control of its contents. The literature on the development of students' information skills at tertiary level suggests that it is necessary to continue to explicitly develop skills in forming strategies for searching and skills in understanding how electronic information retrieval works (Barry, 1996; Gillingham, Ellefson, Topper, & Worthington 1996). The complexity of the processes involved in developing information literacy have been emphasised (Gawith, 1995; Moore, 1995). The results of this study support the arguments in the literature for some ongoing formal training in information literacy at tertiary level. For example, comments that were made during interviews showed that students were puzzled about how the search engines could possibly have matched their keywords to the documents retrieved. In some cases they tried to apply their information retrieval skills (from conventional library experience) when using Internet search engines and they found that things did not work as expected. When working independently, these negative experiences were left unexplained, with the result that their feelings of power and competence with respect to the Internet were undermined.

Difficulties in understanding search engines are exacerbated by the sheer number of different engines (all of which form their indexes in different ways), and the trade secrecy that surrounds the way different search engines rank and weigh material (Reynolds, 1997). However, competent use of search engines is critical to the efficient use of the Internet. This involves understanding how an electronic database is both similar to, and different from, a conventional library catalogue system. In particular, the difference lies in being able to retrieve from the full text of a document rather than just from the title or associated keywords. Shifting the concept of the Internet from a library to a full text database is one approach to making sense of the difference. In the context of pre-service teacher education, this technical approach to conceptualising Internet searching could be explicitly related to ways of developing children's concepts of the Internet and how to search it.

Finally, it could be recognised that the Internet is an emergent technology which is not currently as efficient as it could be as an educational tool. Discovering what it has to offer is time consuming and frustrating at times. There can be a high degree of uncertainty in its use, even for those with experience. Given that modernist notions of technology have led to the expectations that the Internet will be reliable and efficient, these experiences of uncertainty can be disquieting. The Internet has been said to collapse time and place; we can use it any time, anywhere. It is true that the Internet can provide access to diverse information at any time of the day or night. However, the Internet user still has to wait to connect to particular sites and for images to download. Waiting can feel like a waste of time. The experiences here are paradoxical when the potential for immediate response is contrasted with long wait times. Some student teachers could justify spending their independent study time in this way but in this study, roughly a third decided that it was not worthwhile. If Internet competence is a requirement for beginning teachers then ways will need to be found to encourage student teachers to invest the time to develop their skills. This could be done in the context of formal courses or through the requirement that basic skills be developed as pre-requisites for formal courses. Overall, this study suggests that there will be many student teachers who need to be supported in understanding what is available on the Internet, developing advanced searching strategies and becoming critical of the strengths and limitations of the Internet as it currently exists.

There was minimal use of e-mail by many of these student teachers during this study. Professional communication in the workplace through e-mail is becoming standard and on-line access to professional development courses via the Internet is likely to increase substantially (Collis, 1996b). In the literature reviewed on the use which is currently made of the Internet in teacher education, reluctance by some to use e-mail, unless it was specifically required, was identified. In this study, it seemed that many would have liked to use e-mail but had no clear purpose for doing so. It would seem appropriate to ensure that student teachers are familiar with this aspect of the Internet through being required to make purposeful use of e-mail in the context of formal courses.

5.4. The role of the Internet in the classroom

In the main, a pedagogical rationale underpins the viewpoints of these student teachers on the role of the Internet in the classroom. Through their own Internet experiences these student teachers had often found Internet-based research to be time consuming. This seemed to pose a dilemma when thinking about the classroom use of the Internet where access was likely to be limited. The resolution of the dilemma of open ended research taking up too much time usually involved the use of strategies to constrain children's Internet use. For example, children would need to 'know' what they were looking for before they began. In the discussion below it is argued that information about, and experience of, classroom based Internet projects which combine dimensions of both information and communication are necessary if student teachers are going to do more with the Internet than low level fact finding and skill building.

The student teachers in this study tended to interpret that Internet as a valuable source of information, especially up-to-date information, which children could 'access' when they were doing 'research'. The emphasis on 'access' resulting in knowledge suggests a concept of the Internet as a source of 'right' answers rather than as a source of information which might be partial, biased, contradictory or even incorrect. However, the interview transcripts also include references to the need for 'scepticism' about the information on the Internet. These student teachers were generally personally aware of the diverse range of Internet based information, but they had not clearly thought through what concept of the Internet they would choose to present to their students in classroom contexts.

The approach that teachers typically use of initially of checking 'facts' on the Internet was noted in the literature (Black, Klingenstein, & Songer, 1995b). The literature reviewed also notes the complexity of successfully implementing research-based learning due to the need to support the many processes involved. The interviews with these student teachers suggested a recognition of the importance of the active involvement of the learner. For example, children need to make decisions about what they want/need to know, they need to sift and search through information and then put what they find out together in some coherent way. When using the Internet as part of this process, children

also need to learn the skills to search the Internet and use e-mail. Overall, this process of creating a 'knowledge construction environment' (Gawith, 1995) is challenging even for experienced teachers. Beginning teachers need to see these processes modelled by those with experience. In considering pre-service teacher education it seems appropriate that beginning teachers be encouraged to clearly articulate their vision for how authentic research-based learning could be fostered. Alongside this, they need to be supported in making some decisions about how to gradually build their experience of this type of teaching so that they resist the strategy of exercising high control over Internet based work.

It is also important for beginning teachers to clarify the concept of the Internet that they intend to communicate to children. The ways in which teachers use the Internet with children are likely to influence children's perceptions of what this tool is all about. If fact-finding is the only kind of Internet based research that children are encouraged to use then the perception of knowledge as a pre-existing commodity, which only needs to be accessed, tends to be fostered. This tendency could be undermined by greater emphasis on using the Internet to communicate, rather than to find information. During the study the student teachers became more aware of the possibilities for communication; however, they tended to be cautious about children's safety as their only experience had been in adult 'chat' contexts. It would be valuable for them to become more familiar with the diverse ways that the Internet can be used for communication (for example, Trewern, 1996). Many of these do not expose children to on-line 'dangers'. However, it would seem appropriate to only allow children access to safe 'chat' locations. It appears that student teachers need to become more aware of some of the practical approaches to dealing with the issue of children's on-line safety that have been outlined in the literature review.

5.5. The role of the Internet in the future of education

The student teachers in this research project were positive about the Internet being another 'tool' to use within the context of a conventional classroom using pedagogical rationales to justify its use. However, they tended to be resistant to the idea that the Internet might play a major role in reshaping education at the primary level. They tended

to argue for the value of 'real' experiences rather than simulations and for the importance of interaction with a 'real' teacher. In their comments during interviews, the influence of some of the other rationales for using IT in education, as outlined by Brown (1997), was evident. For example, there were some responses which suggested that Internet skills were the skills of the future, indicating a vocational rationale. There was some indication that Internet skills might also be associated with being up-to-date and economically competitive. Whilst some student teachers indicated an awareness of the way the Internet might transform schools, they did not use a transformation rationale to justify using the Internet in the classroom. The commercial rationale recognising the benefits of school use of the Internet to the IT industry was not mentioned. Nor was the need to use the Internet to attract pupils to a school or the possible use of the Internet to reduce staffing costs in schools.

Whilst not all of these rationales were specifically mentioned it is however the case that they influence thinking on the role of the Internet in education. Some rationales influence policy making more than they influence current classroom practice. The development of an awareness of each of the rationales, debate as to their relative significance and a strengthening of the understanding of the pedagogical rationale, could take place as part of formal teacher education courses on the Internet. This could include developing a critical understanding of the significance that 'information age' theory has for educational practice; for example, by considering the importance of the post-modern conception of knowledge as nothing more than a commodity.

'Information age' theories have had a significant impact on practices in the workplace but the relevance of these ideas for education at primary level has not been fully explored. For example, whilst technological knowledge is rapidly changing and it is critical to have a leading edge technologically to compete in global markets, it is not necessarily the case that every aspect of early education should place its main emphasis and value on 'up-to-date' knowledge. In the context of the stock market it is critical to have the very latest information but even in this context the need to analyse and synthesise the information (probably drawing on knowledge of past trends) is necessary for effective decision making. Education in an 'information age' needs to equip students

with skills and strategies for much more than merely accessing information. Helping children to identify what they want/need to know and why they want/need to know it should be at least as important as learning how to access information. Exposure to arguments about the directions education might take in an ‘information age’ would prepare student teachers more adequately to lead debate on, and practice in, using the Internet in education.

Overall, the results of this research study are paradoxical in that they indicate a strong positive emotional response to the Internet, but also a scepticism about its real usefulness and an attitude of resistance to the possibility that it might have a significant impact on how education is organised and conceptualised. A deeper understanding of this paradox by the student teachers, could be gained through exposure to ‘information age’ theory and the different rationales for using IT and the Internet in education. This may support them in thinking about technology in terms of “human values and desires” (Sofia, 1993: 40) rather than thinking that educational change is determined by technology.

5.6. Summary

The results of this study suggest that independent access to the Internet has benefits in fostering the development of concepts of what the Internet offers and in searching skills. However, the process of learning to use the Internet is different for different individuals. The results of this study seem to be consistent with the model suggested by Collis (1996a). She suggests that the degree to which an innovation is accepted depends on there being a perceived ‘payoff’ to compensate for the ‘problems’ experienced and that ‘pleasure’ in using the technology is also a factor determining whether or not it will be adopted. In this study, ‘high’ and ‘medium’ users seemed to gain the required ‘pleasures’ and ‘payoff’, but for ‘low’ users the time consuming nature of Internet searching led to some resistance to using it.

The study indicates that many student teachers are likely to need the support of experts if they are to pass ‘beginners’ level in using the Internet. It has been argued that this support could be provided in the College of Education library so that the development of Internet based research skills are offered alongside more traditional approaches. A focus

on reconceptualising the Internet from an encyclopedia into a full text database has been suggested as a way of helping student teachers to make sense of Internet searching techniques. Skill in using e-mail could be strengthened by integrating its use into formal courses. This use needs to be compulsory, rather than optional, and it needs to be seen as being purposeful. The use of 'chat' should be allowed on a restricted basis.

Generally, using 'chat' is recreational but as it tends to foster pleasure in using the Internet it is likely to influence its uptake positively. 'Chat' is also likely to be an important part of the Internet culture experienced by children and hence a familiarity with it is relevant to student teachers. It may also have some application in fostering communication skills.

The trend towards providing information or knowledge in forms packaged for niche markets, including education, have been outlined above. Whilst this is likely to appeal, as the Internet is currently unwieldy to use, the issues associated with knowledge being valued according to its use in the market place need to be considered critically. It has been argued that children should be encouraged to use the Internet for open ended research in order to develop sophisticated information literacy skills rather than just to look up 'facts'. Developing the use of the Internet for communication needs to be part of this research process if the tendency for knowledge to be seen as a packaged product is to be undermined. The demanding nature of this form of teaching has been recognised and pre-service teacher education needs to foster the development a vision for using the Internet and a strategy for gradually reaching that vision.

Finally, the results of this study indicated the tension between the concept of instant access to information and the reality of the time consuming nature of Internet use. It has been argued that understanding this paradox and being in a strong position to debate the possible roles that the Internet might take in education requires knowledge of a number of different rationales that influence the uptake of this technology. The ways that student teachers articulate their pedagogical rationales could be strengthened. An awareness of the economic forces at work in this area and the social issues associated with the 'information age' are also relevant. Overall, a combination of pedagogical theory,

'information age' theory, and skill building is required to position student teachers strongly to lead debate on, and practice in, the use of the Internet in education.

Chapter Six

Conclusion

Technological change itself is neither the path to progress nor the road to Armageddon. It is a process subject to struggles for control by different groups, the outcomes of which depend primarily on the distribution of power and resources within society. Perhaps by understanding the dynamics of this process we will be better placed to assert our right to shape it.

(Wajcman, J. 1994: 12).

6.1. Introduction

In this chapter the original aim of describing and analysing the experiences of student teachers as they used the Internet is evaluated and some implications for research, teacher education, and educational policy are suggested. The evaluation of the aim includes a discussion of the limitations of this study. It argues that because a broad scope has been taken many aspects of the analysis of this study could be developed in more depth. Also, generalisation from the experiences of the sixteen student teachers who chose to participate needs to be considered very cautiously. Further research into the personal/professional use of the Internet by student teachers, teacher education relating to the Internet and the classroom use of the Internet is required. It is also necessary to develop a theoretical understanding of the relationship between technological change and educational change.

In teacher education, the requirement for teachers to show leadership in their use of IT has been documented in the 1997 Green Paper on teacher education (Ministry of Education, 1997). Teacher education courses which encourage teachers to explore and reflect on the many options that the Internet offers, particularly for increasing the 'authenticity' of classroom experiences, are needed. This study has some implications for policy on the use of the Internet in education in New Zealand as it suggests that teachers are likely to resist using the Internet for the purpose of reorganising primary education. In the final remarks of this thesis, while recognising both the power and

potential of the Internet, it is argued that it is important for human values and educational rationales be used in determining the role it could or should take in primary education.

6.2. The aim evaluated

The original aim of this study was to understand the experiences of student teachers when they used the Internet. In order to begin to do this, the study aimed to describe and analyse some aspects of the Internet experiences of pre-service teachers when they were working independently. It has shown that for the sixteen student teachers who participated there was diversity in their skill development and in their interpretations of the role of the Internet both now and in the future. Using the data collected it has been possible to describe the experiences students had with the Internet in some detail.

Analysis of the comments made has indicated a general tendency to interpret the Internet as ‘amazing’ but ‘time consuming’ (for example, see the transcript from student P, Appendix J). The tension between the Internet’s amazing potential compared to the frustrations of actual using it, seemed to influence the way its role in current classrooms was perceived. A rather narrow, fact finding approach was common. In general, these student teachers were resistant to the idea of the Internet becoming the major form of educational provision at primary level.

6.2.1. Limitations of the study

Overall, the evaluative case study approach using both questionnaires and structured interviews provided data relevant to each of the research questions outlined in section 3.3. However, a number of limitations are outlined below. These include the role of the researcher, the time frame for the study, the size of the sample and the circumstances in which the research took place. Some suggestions are made for how the research questions used could be explored in more depth in future studies.

In this study the researcher was a lecturer at the Wellington College of Education and during the early part of the study some of the student teachers involved were taught and assessed by the researcher. Given the position of the researcher, it may be the case that the participants chose to reveal some aspects of their experiences during interviews and to conceal other aspects. For example, some mention was made of the ways in which the

acceptable use policy was not adhered to, but the extent of non-compliance was probably not revealed during the interviews. It may also be the case that when commenting on the classroom use of the Internet, the student teachers may have answered in ways that would be likely to please the researcher. Overall, though this may be the case, it merely reflects the fact that there are many ways of describing experiences and any story told will be selective in some way.

The time frame for the study was six months. This proved adequate for allowing the student teachers involved to develop their Internet experience until there were apparent patterns for different individuals. However, over this time span it proved difficult for participants to accurately record each experience in their Internet diaries. A complete record of what they did during each session was not available.

It is obvious that a sample of sixteen students is a small one. It also needs to be recognised that these student teachers chose to participate. The experiences of the forty students who chose not to participate might have been very different. Choosing to participate could be seen as an indication of a particular interest in the Internet, however, there were some participants who made very little use of the Internet during the study. For this reason, the results might indicate experiences that are more typical than could be expected from a high interest group. This study only looked at experiences during independent study time during which it was completely optional as to whether the Internet was used. Carrying out a similar study on skill development, usage patterns and opinions but in the context of a formal course, where support was offered and Internet use was compulsory, might reveal different results.

The actual research questions used for this study also proved to be a limitation because each of the seven research questions was quite broad in scope. For example, this study provided some information about how the Internet was conceptualised but this in itself could be explored more fully through in-depth interviewing. The personal involvement inventory (used in phase three of this study) is suitable for large scale survey methods and could be used with the whole student population to clarify how the Internet is perceived. The different 'relationships' that 'high', 'medium' and 'low' users had with

the Internet could be explored in much more depth, particularly to consider the ways in which the Internet is found to be pleasurable. The study indicated that some participants used the opportunity to explore personal issues. The post-modern idea of personal identity being something which is multiple and shifting, and which can be explored through the Internet, also has important implications for education which could be researched. Data from this study on how the Internet was used indicates some possible trends, but the study did not attempt to describe this use in detail. Given that the results suggest that there are difficulties in searching the Internet it would be worthwhile to research this more fully, probably through participant observation as well as interviews. The interpretations of the Internet for teaching, learning and the future are also rather tentative. They do suggest that though there is a tendency for 'techno-worship', student teachers are also likely to be critical of the Internet. Again, far more research is required to clarify how student teachers view the role of the Internet in education.

This study was also hampered to some extent by a need for greater clarity about the theoretical framework for the research. Reference has been made to using symbolic interactionism as a framework but this has only been superficially developed through the research methodology. The use of post-modern theoretical ideas reflects the interest of the author in trying to find a theoretical understanding of the diversity of experiences that people have with technology. An interest in theoretical work which argues against technological determinism also reflects the interests (and probable biases) of the author. However, these theoretical positions could have driven this research study in a more deliberate way. Whilst these theoretical ideas have not determined the methodology of the study they have led to a discussion of the results which does take account of the bigger picture of technological, economic and social change. Though these limitations need to be taken into account, this study has provided some insight into the experiences of student teachers as they begin to use the Internet.

6.3. Implications for research

There is obviously a need for much more research into the way the Internet can be used at all levels of education. In the previous section, some directions for possible research which follow up on the specific research questions of this study have already been

outlined. In teacher education, the next step could be to design and evaluate Internet focused courses which develop pedagogical themes, alongside theoretical understanding of the ‘information age’ and rationales for using the Internet in education. In the classroom there is a need for a stronger research base on the processes involved in developing information literacy. Given that the Internet could have a major impact on how education is conceptualised, the experiences that children have when they use the Internet need to be researched, not to establish whether the Internet has an ‘effect’ but to try and understand how children conceptualise information and knowledge. The use of the Internet in education is only just beginning and at this point in time a wide range of exploratory research is necessary to support debate on the role it could or should take in the future.

6.4. Implications for pre-service teacher education

This study suggests that it is possible for basic skills in using the Internet to be developed outside the context of formal courses. However, because skill development depends partially on the time invested, it would be necessary for a formal requirement to be made, for example, evidence of skill being a pre-requisite for a course. This study suggests that many students will require expert support in developing their Internet skills. This could be provided in the context of the College of Education library or via an IT help desk. The rationale for skill development taking place independently is that learning skills is then likely to be situated in a meaningful context and as such, is more likely to be valued and retained. Also, this approach allows teacher education courses to focus on teacher education. This study suggests that student teachers need a stronger understanding of the pedagogy of information literacy and that they need to identify goals for developing their teaching skills in this area. Recognition that, in a typical classroom context, this is a demanding form of teaching needs to be taken into account and student teachers need to have research-based learning, using the Internet, modelled by experienced teachers. In order to enable student teachers to begin their careers with adequate preparation to debate the role of the Internet, it is recommended that courses include a discussion of the competing rationales for using IT (and the Internet) in education. Some understanding of the ‘information age’ and its relevance to primary education is also required. Overall,

teacher education at the pre-service level should encourage the development of approaches which put educational values first in the debate about the role of the Internet.

6.5. Implications for national policy on information technology

In the recent Green Paper on teacher education there was a suggestion that teachers should “lead” work in using IT in classrooms and that changing patterns of learning are inevitable as technology advances (Ministry of Education, 1997). Teachers do need to show leadership in this area but that does not equate to passively accepting educational changes as a consequence of the availability of the Internet. Rather, it involves teachers reflecting critically on when, where, how and why they choose to use the Internet both in their classrooms and for other professional purposes. Policy on the expanding use of the Internet needs to be informed by a debate which includes the viewpoints of teachers and places educational values alongside other issues which concern policy makers.

Policy makers are likely to see the Internet as a means of improving the efficiency of the provision of education through reductions in the numbers of teachers required. As indicated in the ERO report on IT in schools (Education Review Office, 1997) growing use of the Internet could also have implications for reconsidering the custodial role of schools. Efficiencies could be gained if school premises do not have to be provided and maintained. A non-custodial role for primary education would involve a major policy shift and would have many serious implications. The results of this study suggest that teachers are highly unlikely to support policy which threatens the traditional organisation of schools. Whilst some change in the pattern of learning is likely, at primary level the scope of education is far broader than the accumulation of knowledge, including for example, learning to learn and the development of physical and social dimensions as well as the cognitive. As indicated in the quotation at the beginning of this chapter, technological change is a dynamic process influenced by the power of different social groups (Wajcman, 1994: 12). The overall implication for policy at the national level is that major changes to primary education which are motivated by cost effectiveness rationales, rather than pedagogical rationales, are likely to be resisted by both pre-service and practising teachers.

6.6. Final remarks

This study has made contribution to a research base which can be used to debate the problem which has been focused on: that of the role of the Internet in education.

Clearly, this is a technology which has wide appeal, many valuable and interesting characteristics and the potential to motivate significant changes in the way education is organised and conceptualised. This report has provided evidence to support the argument that human values and educational rationales should drive the directions that these changes take.

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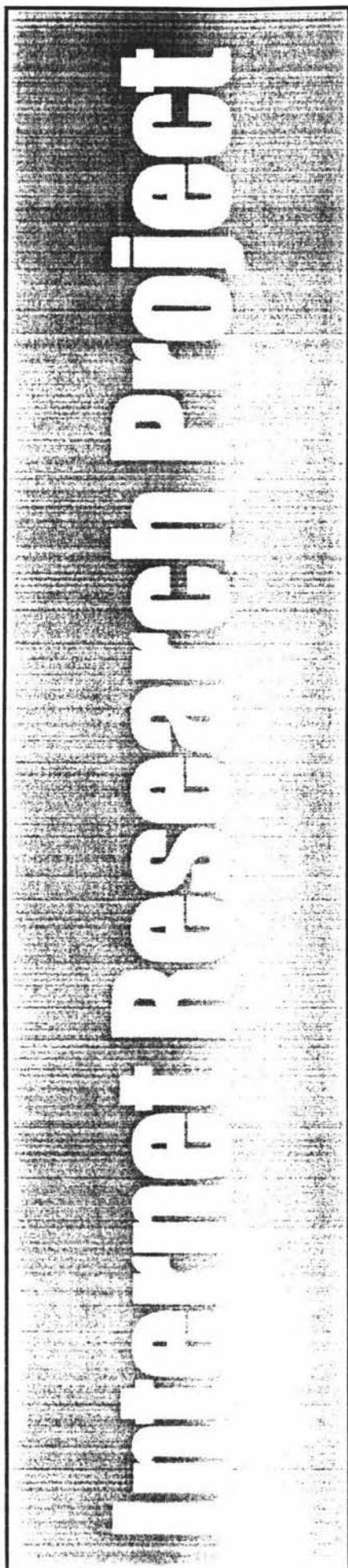
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To all AS3 students:

Are you interested in participating in a research project on student teachers' perceptions of the Internet?

Internet access will be provided during your free periods of the day.

The research is being done by Robyn Smits - HOD Technology

To find out more please come to an introductory meeting:

Date: Wednesday 19th March

Time: 10.45 - 11.00am

Place: T207

If you are interested but can't make the meeting please leave a note on my door - T3.14

Appendix B: Information for participants

Information Sheet Student Teachers' Perceptions of the Internet

The Researcher

The researcher is Robyn Smits, HOD Technology at Wellington College of Education. This research project is being undertaken as an MEd thesis from Massey University. It is supervised by Mark Brown and Tracy Riley from the Department of Educational Psychology at Massey University.

The Nature and Purpose of the Study

This research project aims to describe and analyse student teachers' experiences in using the Internet and their perceptions of the Internet. The reason for carrying out the project is to provide a research base for planned provision of Internet services at Wellington College of Education. In order to carry out this study participants will be provided with Internet access between 8.30 am and 5pm, Monday to Friday. Internet access will not be available during scheduled classes. The duration of the access to the Internet will be between 8 weeks and 16 weeks. Availability will depend on the budget for Internet costs which is set at \$1500.00 for the overall study. This study has been supported financially by the Wellington College of Education Staff Tertiary Scholarship.

Contact Numbers

Robyn Smits	476 8699 ext 8879
Mark Brown	(06) 356 9099
Tracy Riley	(06) 356 9099

Participants' Involvement

All students who are undertaking the final year of a two year teacher training programme (AS3) have been invited to participate in the study. This cohort of students has been selected because they bring a year of experience within the College of Education and the group is a manageable size for the study.

Participation is optional. Any participant can withdraw at any time or refuse to answer any particular questions at any time. Participation is not linked to any courses within the College or any assessment procedures.

Participants in the study will be required to do the following:

1. Sign an acceptable use of the Internet policy agreement form
2. Complete a questionnaire detailing their previous computer experience

3. Participate in four tape recorded group interviews which will ask the following questions:

- a) How do you feel about using the Internet?
- b) How would you describe the Internet?
- c) How would you describe your experience of using the Internet?
- d) What problems have arisen for you in using the Internet?
- e) Thinking about children's learning, how would you describe the role of the Internet?
- f) Thinking about your work as a teacher, how would you describe the role of the Internet?
- g) Thinking about the future of education, how would you describe the role of the Internet?

4. Agree to keep the group interview information confidential.

5. Keep a log of each Internet session with a brief description of the events during the session.

6. Agree to Internet usage being monitored by the Network manager and researcher.

As the Internet is a source of a wide range of information, access to it may benefit participants in the study. Participants will be provided with documentation showing that they did participate in the study. This documentation will state the purpose of the study and its duration.

Access to the Research Results

A summary of the research will be available to participants should they want it. Participants will be asked to fill in a request slip for a summary report. This summary will be disseminated via student pigeonholes.

Confidentiality

Audio tapes will usually be transcribed by the researcher but where a research assistant transcribes tapes they will be required to sign a confidentiality agreement. At the end of the project the audio tapes will be destroyed. During the study the audio tapes will be stored in a locked filing cabinet in the researcher's office.

Information given will be confidential to the research and any publications arising from it. No participant in the study will be named without their permission. As the study involves group interviewing, participants within the group will need to agree to maintain confidentiality.

Rights of Participants

Participants have the right:

- to decline to participate
- to refuse to answer any particular questions and to withdraw from the study at any time
- to ask any questions about the study at any time during participation
- to provide information on the understanding that your name will not be used unless you give permission to the researcher
- to be given access to a summary of the findings of the study when it is concluded.

Appendix C: Research consent form

Student Teachers' Perceptions of the Internet Consent Form

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction and I understand that I may ask further questions at any time.

I understand I have the right to withdraw from the study at any time and to decline to answer any particular questions.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission. (The information will be used only for this research and publications arising from this research project).

I agree/do not agree to the interviews being audio taped.

I also understand that I have the right to ask for the audio tape to be turned off at any time during the interviews.

I agree to participate in this study under the conditions set out in the Information Sheet

Signed:

Name:

Date:

Appendix D:

Computer Network Acceptable Use Policy

Wellington College of Education
Te Whānau O Ako Pai Ki Te Upoko O Te Ika

Computer Network Acceptable Use Policy

Before receiving your network login and password, you are required to read the following:

1. The Wellington College of Education (WCE) network shall not be used to transmit any communication in any form(e.g. text, images, sound) where the content and/or meaning of the message or its transmission or distribution would violate any applicable law.
2. The network shall not be used to **transmit** any communication in any form(e.g. text, images, sound) where the content and/or meaning of the message or its transmission or distribution is likely to be deemed obscene, abusive, or highly offensive to recipient(s).
3. The network shall not be used to **deliberately receive** any communication in any form(e.g. text, images, sound) where the content and/or meaning of the message or its transmission or distribution is likely to be deemed obscene, abusive, or highly offensive.
4. Electronic mail shall not be used for:
 - Discrimination on the basis of race, gender, religion, disability or sexual orientation;
 - Sexual harassment;
 - Copyright infringement;
 - Personal political beliefs;
 - Personal business interests; or
 - Any unlawful activity.
5. All material entered within the WCE electronic mail system may be monitored by appropriate personnel.
6. Users of the WCE network shall avoid, if possible, creating congestion within the network, thereby interfering with the work of other users of the network. **The downloading of software is not permitted.**
7. Users of the WCE network services shall respect the rights and property of all others and shall not improperly access, misappropriate or misuse the information/files of other users.

8. The WCE network shall not be used for commercial purposes. Advertising of commercial offerings is forbidden.
9. With advice/recommendations from the WCE network manager the technology department is responsible for the modification and distribution of this Acceptable Use Policy to students.
10. Withdrawal of use privileges because of violations of this policy is the responsibility of the Head of Department, Technology with advice/recommendations from the WCE network manager.

Name:

Date:

Appendix E: Experience profile

Experience Profile

Name:

Please circle your sex and age group:

Sex: Female Male

Age:	Under 20	20 - 25	26 - 30	31 - 35	36 - 40
	41 - 45	46 - 50	51 - 55	Over 55	

Please tick the appropriate boxes.

For areas of experience more than one box can be ticked.

Areas of Experience

Technical Skill Level

	Personal	Professional	Classroom	None	Novice	Beginner	Competent	Expert
Wordprocessing								
Database software								
Spreadsheet software								
Desktop publishing								
Multimedia authoring								
Drawing Software								
Electronic mail								
Internet searching								
Internet browsing/"surfing"								
Other software: (Please state.)								
Using Apple Macintoshes								
Using Acorn Archimedes								
Using IBMs and IBM compatibles								
Other type of computer: (Please state.)								

Adapted from Mockford, C. (1995) Teaching Information Technology in Higher Education through a Task-focused Approach: initial reporting of a pilot teaching programme. *Journal of Information Technology for Teacher Education*, Vol 4, No 1, 1995

Appendix F: Internet diary form

Internet diary

Name:

Briefly note the details of your use of the Internet below.

Date	Log in time	Log out time	What was your main purpose during this session?	What features of the Internet did you use?	Overall, were you satisfied with your use of the Internet during this session?	Did you encounter any problems?

Please return to Robyn Smits, HOD Technology, T3.14

Appendix G: Memo 14/5/97

Memorandum

Box 17-310 Telephone
 Donald Street 0-4-476 8699
 Karori Facsimile
 Wellington 0-4-476 7189
 New Zealand



WELLINGTON
COLLEGE
OF EDUCATION
TE WHĀNAU
O AKO PAI KI
TE UPOKO O TE IKA

To Internet research Group **From** Robyn Smits
Copy To **Date** 14/05/97
Subject Logs for Internet Sessions

I have had a couple of people pass their log sheets to me but most of you haven't! Part of your agreement in participating in the project was to complete the logs; have you been doing it? If not, please do so from now on. The forms are available in T206 and T207.

I would appreciate if you could return this sheet with answers to the following questions:

I need help with using the Internet	yes/no
I need help with using e-mail	yes/no

I am available at the following times for some help:

I have been keeping my log most of the time yes/no
 (Be honest!)

Return this to my pigeonhole or T314 with the log if possible.

Appendix H: Phase three questionnaire

Internet Research Project

Name:

Please circle to indicate your choices.

1. How would you describe your current skill level:

- a) Finding information on the Internet:

Novice	Beginner	Competent	Expert
--------	----------	-----------	--------

- b) Communicating using electronic mail:

Novice	Beginner	Competent	Expert
--------	----------	-----------	--------

- c) Communicating using Internet chat:

Novice	Beginner	Competent	Expert
--------	----------	-----------	--------

2. During this research project how many hours have you usually spent using the Internet each week?

..... hours

3. What portion of your Internet time has been spent on specific research relating to teaching/learning?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

4. What portion of your Internet time has been spent searching for educationally relevant sites?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

5. What portion of your Internet time has been spent on browsing without a specific purpose?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

6. What portion of your Internet time has been spent using e-mail?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

7. What portion of your Internet time has been spent using Internet chat?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

8. What portion of your Internet time has been spent recreationally?

None	Very little	Some	Quite a lot	Most
------	-------------	------	-------------	------

9. How much has access to the Internet helped you with planning for sole charge teaching?

Not at all	Very little	Some	Quite a lot	Extremely
------------	-------------	------	-------------	-----------

10. How much has access to the Internet helped you with College assignments?

Not at all	Very little	Some	Quite a lot	Extremely
------------	-------------	------	-------------	-----------

11. Have you received any 'inappropriate' material while chatting on the Internet?

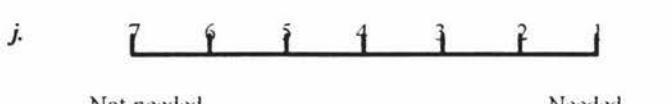
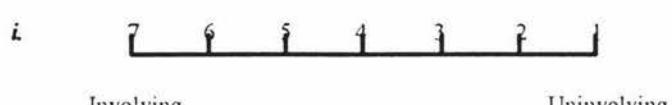
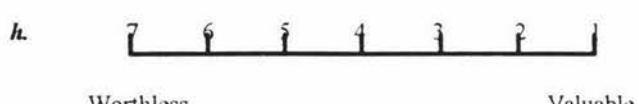
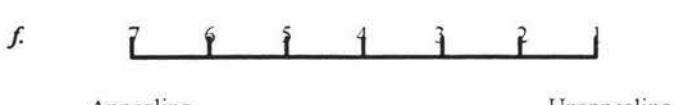
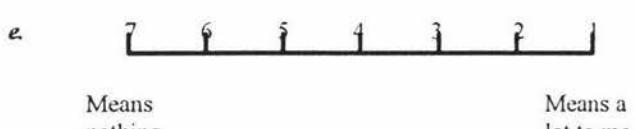
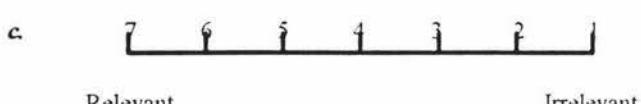
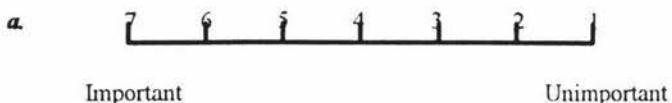
yes/no

12. Have you received any 'inappropriate' material while searching the Internet?

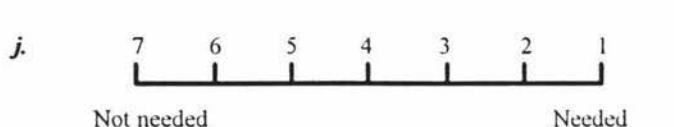
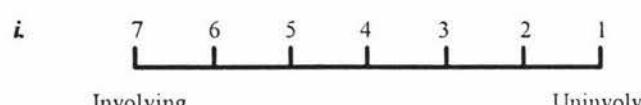
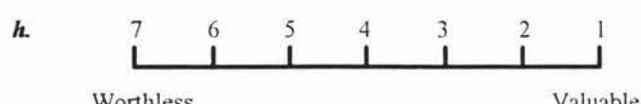
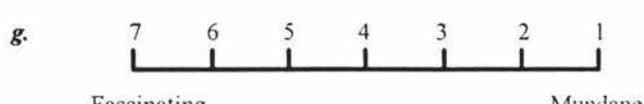
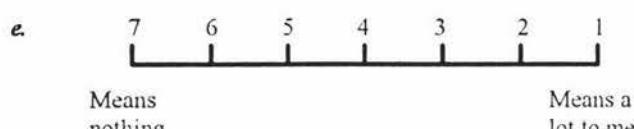
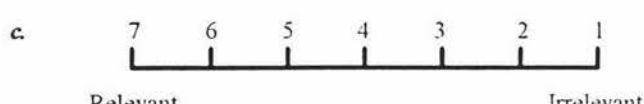
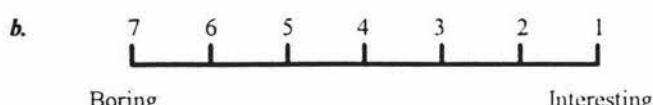
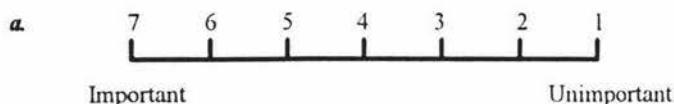
yes/no

13. Is there any other information you would like to add about your use of the Internet during this project?

- 14.** For each of the following scales, please circle the number that best describes your perception of your personal use of the Internet.



- 15.** For each of the following scales, please circle the number that best describes your perception of the use of the Internet by children in school.



Thank you for your participation in this project.

Appendix I: Invitation to phase three interview



WELLINGTON
COLLEGE
OF EDUCATION
TE WHANAU
O AKO PAKEHĀ
TE UPOKO O TE IKA

(64-4)
 (64-4)

Wednesday, 17 September 1997

Quebec St
Kingston
Wellington

Dear

Thank you for your participation in the Internet research project this year. I have decided to complete the data gathering with this questionnaire and would appreciate if you can complete it and return it to me with the self addressed envelope or by bringing it in to College next week.

I would also like to carry out one more interview with a small number of participants: 2 high users, 2 medium users and 2 low users. You are one of the low users that I would like to interview. Could you ring me either at College or at home (499 1420) to arrange an interview time. I am available at any time during Wednesday 24th September - Friday 26th September. The interview is likely to be in more depth than the previous interviews and I would like to allocate 45 minutes to each one.

I will be sending you a copy of the results section of my thesis for your information. I hope to be able to do this by the end of November. All the best for your future and once again, thanks for your participation in this project.

Regards

Box 17-310
Donald Street
Karori
Wellington
New Zealand

Telephone
0-4-476 8699

Faximile
0-4-476 7189

Robyn Smits
HOD Technology

Appendix J: Sample phase two interview transcript

*Interview 1, Student P, 2nd April 1997

*RS Q1

How do you feel about using the Internet?

*Q1

Well, I haven't spent much time on it. I think its a bit of a time waster at the moment. There's so many people out there don't know how to use it and a lot of people are just playing around to learn how to use it. It takes a long time to learn about it. I spent a week on it and got nowhere. It is a very, very good thing to have but it is too time wasting. A lot of people don't use it for finding information. They just use it for a fun, enjoyment sort of thing. There is a lot to enjoy on it. Its more geared up for people and more economical for people who are using it for educational use or for business use. Things like that. People who know exactly where they are going.

*RS Q2

How would you describe the Internet?

*Q2

I guess its a library. I've always gone down to the library and hated using it because you just don't know where to look for things. I like Encarta, like CDs, because you click on something and you do searches and you can find any information. With the Internet its basically like going down to the library; there are so many books there. But you can put a search through a certain word and it'll tell you exactly where it is without a lot of time saving but a lot of time wasting if you don't know where you're going; you've got no aim. Its getting information very, very quickly from all around the world. Also communicating with them and that's basically what it is. Its called a web. Everything is called a web so its basically someone has gone through there and made whole lot of pages and there is search agents which help you get through them. So its basically the spider to go around and search this web.

*RS Q3

How would you describe your experience using the Internet?

*Q3

At the moment its all, I've actually got it on my home computer but I don't use it because I can't afford it. I got a free connection and it is \$2.50 an hour and I just can't afford to use it. My experience is going on there for a short amount of time, really aimlessly looking for things, can't find them so I give up. A bit of frustration. I haven't searched it that much but what I've seen is quite amazing. We were actually looking for things for diving for a friend and we found the place and there was an e-mail address. The night after that, two o'clock in the morning this friend of mine was called up with faxes from Egypt. A whole lot of faxes from Egypt. Basically you can get anything from it. There's so much information, there's too much information in a way. My problem is that the computer's not quick enough to deal with that information and the telephone lines aren't quite there yet.

***RS Q4**

What problems have arisen as you use the Internet?

***Q4**

Time. Too much information. Also, how specific you have to be because I put headings in and you get two million; there's too much on it in some ways. One thing I've learnt lately is that if you want something specific for education you don't go in and type education. You have to make sure that you cut it down to New Zealand first, then education. Instead of two million you get two hundred. Because you cut it down quite a lot. There's New Zealand, there's the server you've got and also the whole world wide web and you've got to make sure you cut yourself right down otherwise you get so stuck and so lost. Basically speed and knowing where things are.

***RS Q5**

Thinking about children's learning, how would you describe the role of the Internet?

***Q5**

I think that it has a place for children but that it has to be very guided by a teacher cause there's too much out there and I don't think the Internet is really, you don't teach the children everything about the Internet. They'll never learn it all and you'll never be able to teach it. You have to basically show them what's in the technological advances. Just giving them a taste of it. And also a familiarity of it. There's no way possible that children can find out about it; even the people who actually run them wouldn't know everything there is to know about them. There's too much to learn and the software that's used to run the Internet is different from place to place to place. They're all compatible but all different.

RS Q6 Thinking about teaching, how would you describe the role of the Internet?**Q6**

The one thing I see in my class there's almost no one who uses the Internet. When it comes to education and teaching it has everything there at your fingertips. I guess it makes you lazy. When it comes to spelling and things we're meant to keep children looking at dictionaries otherwise they forget how to use them. I suppose it is the same in this way; we ourselves shouldn't rely on them but there's a big place for it. If we can't find the information straight off there is a lot there and its even broken down into the curriculum areas with specific learning outcomes on there already. So, there's a lot there for us. As a teacher we shouldn't; I seen some stuff on there, you could basically run your class off it but I guess it comes down to you can't rely on it. You have got to use it as a backup for you. Something to base everything on but its not what your programme should be run on. You've still got to do your own thinking and your own research from other places. Otherwise you'll forget everything else.

***RS Q7**

Thinking about the future of education, how would you describe the role of the Internet?

***Q7**

I think that the Internet is going to become not quite as effective. It is going to stay about the same for education. It isn't going to get more advanced. Apart from the

amount you can see in there and what they can get in there it is not going to change that much. Really, what they're looking into is entertainment a bit more on it. Its going to be more games. At the moment there's lines going through to make it have the ability for live pictures as well computer images on the screen at the same time. The more on the actual, I think at the moment there's enough on them for education. I don't think it can get much more advanced than it is at the moment. Its basically giving you the information. I don't think the children would need more than that. I suppose you lose the hands on of you spend too much time on it and its never going to get that far that you're going to get hands on use. It'll move a bit further. As X said it is going to make almost as far as it can go, capability wise, by the end of this year because you're going to be able to have the TV images on there. You can't get much better than TV images and I don't think it is possible that 3D images are going to be brought onto it. But the future, I don't know where its going to go to apart from what they've told us at the moment. That's still in the pipeline.