UNIVERSITY OF SOUTHAMPTON

FACULTY OF LAW, ARTS AND SOCIAL SCIENCES

School of Education

Primary teachers' attitudes to Information and Communication Technology (ICT) in education

by

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Thesis for the degree of Doctor of Education

May 2007

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

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PRIMARY TEACHERS' ATTITUDES TO INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

By Cecilia Antoinette Amey

Information and Communication Technology (ICT) has been associated with primary education across three decades. During this period a number of initiatives have been introduced to develop the use of ICT in teaching and learning. The latest and arguably the most significant, in 1997, sought to provide comprehensive training for teachers to become confident and competent to teach using ICT. That this has not been fully achieved is a cause for concern.

It is proposed that teachers' attitudes have an affect on their use of ICT in teaching and learning. The key research question addressed is to identify: What attitudes do teachers' have to ICT in teaching and learning in primary education and what factors underlie them? The position adopted regarding attitude is that it is multi-conceptual encompassing mindset, bearing, perception, philosophy and psychology. This study investigates teachers' thinking about ICT, what influences their use of it, their awareness of it and how they behave as ICT users.

This research adopts a multi-method qualitative approach using text analysis software to process the data collected from interviews, observations and questionnaires. The data source originates from primary school teachers working in Key Stages 1 and 2 in a cross-section of schools in the south of England.

The contribution this research makes to the body of knowledge regarding ICT in primary education is the development of a different approach to teachers continuing professional development with ICT in teaching and learning. This is based on considering the individual's attitudinal location.

Further research is proposed to confirm the results from this study using the same research design. In addition two significant questions arose from this study. The first being: What measures do teachers' use to judge their ICT practice against and what opportunities for this are provided? The second: What is the quality and content of the pupil/teacher interaction with ICT in the classroom? This will be addressed in future research.

Keywords: teachers' attitudes to ICT, pedagogy, pedagogic model, ICT in primary education, ICT and pedagogy

Acknowledgements

I wish to thank Professor Helen Simons and Doctor John Woollard for their support and guidance during the duration of this thesis.

Thank you to my husband, who took being a critical friend to new extremes and for listening, reading and transforming sketches on scrappy paper into presentable diagrams.

I am also very grateful to all the teachers who gave their time and support to me.

And a big thanks to my cat Havana who alleviated stress and accompanied me at the computer!

This thesis is dedicated to my parents who would have been extremely proud of their daughter.

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Chapter 1 Introduction

The issue of primary teachers' attitudes to teaching and learning with Information and Communication Technology (ICT) has occupied my thoughts for a long time. The following quotation from my unpublished dissertation for a Masters degree in 1998, expresses my view of teachers' attitudes to ICT nearly a decade ago.

> Government funding can improve the hardware and software in schools, however no matter how much funding is allocated to in-service teacher training, attitudes are more difficult to change. Willingness and commitment to bring about improvement has to come from within teachers. Those teachers who have not already embraced ICT in their teaching pedagogy will need considerable training and encouragement to do so. Training all serving teachers to a certain level of ICT competence is going to be a mammoth task (Amey, 1998: 22).

Government expenditure since 1998, allocated for the implementation of ICT in primary education, has alleviated some of the issues that were previously considered to be inhibitors to the use of ICT in teaching and learning. Funding has been provided for equipment, both hardware and software, together with training for both student and serving teachers. In the light of this, I now want to see if this funding has encouraged a change in the willingness and commitment of teachers to embrace ICT in teaching and learning. Using ICT successfully in teaching and learning calls for the primary teacher practitioner to be able to manage its use.

The focus for the research reported in this study - teachers' attitudes towards ICT in teaching and learning - developed as a result of my own knowledge, interest and experience about the subject. Strauss and Corbin (1998) suggest that empirical knowledge and experience is a valid and legitimate base from which to develop a research endeavour:

> The touchstone of one's own experience might be a more valuable indicator of a potentially successful research endeavour than another more abstract source (: 38).

My knowledge of teachers' use of ICT in teaching and learning stems from my experience of having co-ordinated a number of subjects as a primary school teacher, ICT being the most challenging. The challenge for me was to encourage

and demonstrate to my colleagues the value of ICT as a resource, in both teaching and learning. As an ICT co-ordinator I witnessed, over a number of years, changes in colleagues' attitudes and approaches to the planning and delivery of ICT, both as a subject in its own right and in its use to support other subjects. I believe that the question of attitude towards ICT in primary education is open for investigation and that the study will contribute knowledge to the understanding of how ICT can be used more often and effectively in primary education.

Literature searches revealed that little has been written about teachers' attitudes to ICT in teaching and learning. My previous experience mentioned above, as an ICT co-ordinator, suggests that changes are beginning to take place. However at this stage I make the assumption that there are variations in teachers' attitudes and commitment to using ICT in teaching and learning. The purpose of the research is to explore these variations and their sources. The underlying assumption is that teachers' attitudes do make a difference to their willingness to use ICT and that this has an effect on teaching and learning in primary education. However the first task is to find out precisely what their attitudes are. The key research question therefore that the research addresses is:

What attitudes do teachers' have to ICT in teaching and learning in primary education and what factors underlie them?

My interest in this question is underlined by an interest in improving the understanding of how primary teachers respond to ICT in teaching and learning and the way they utilize its potential in the classroom. Identifying the underpinning factors impacting on teachers' attitudes can provide an insight into their feelings, beliefs and behavioral intentions regarding ICT. Janesick (1998b: 51) talks about the contribution of qualitative research and how it, '...can enhance educational and human services practice'. This research seeks to enhance the understanding of one facet of ICT in primary education.

It was with the arrival of a single Commodore Pet system at my school in the early 1980s that my interest in computers first began. Its arrival raised a gamut of emotions amongst the staff. To make it more appealing and user friendly, one was

able to customize the machine by placing a furry jacket on the 'new pet'. Was this supposed to create a feeling of comfort and acceptability towards the machine? Well, in my case this marketing ploy certainly worked. I had been enticed into the 'games culture', albeit, by a very simple version of electronic table tennis. The arrival of a new BBC B system received little attention from female colleagues or pupils and soon joined the realm of 'toys for the boys', although no self-respecting male would admit to playing an endearing computer game called 'Frogger'. The aim of Frogger was to guide a frog to safety across a stretch of water. The way across was by jumping from log to log, however the water was infested with dangerous crocodiles. Could Frogger really have been a metaphor for the introduction and adoption of computers in primary education? This process has stretched across three decades and has been 'infested' with numerous government initiatives. In the same way that the frog needed to be guided across the water so too teachers needed and still need to be guided to the safety of knowing how best to use the information and communication technologies that are available to them. To be required to learn and use effectively a continuously evolving resource to support the curriculum, is surely asking a lot of the classroom teacher.

There are many social, political and personal issues that impinge on an individual's attitudes and these are exemplified by a number of factors ranging from personal mindset to institutional policy. At the time of my initial research, I questioned the willingness of teachers to alter their attitudes toward ICT in order to affect a change in their teaching by its use. In addition, at that time findings showed that teachers underestimated the value of information technology (IT) in the classroom and were also unaware of what it could do for their teaching (Amey, 1998).

It was from the perspective of both an ICT co-ordinator and a classroom teacher that I saw the possibilities and potential of ICT as a means by which to engage children in the learning process. This provided the motivation for me to undertake a Masters degree in Computer Based Learning and Training. My research for this was based principally on the issue of potential enablers and inhibitors concerned with the implementation of ICT in primary education and was situated within the

point of view of ICT co-ordinators. It did not take into account the attitudes and personal experiences of classroom teachers. With the benefit of hindsight I now see that my focus was aimed more towards the implementation rather than the potential shortcomings of the whole process of ICT in the classroom. Teachers were being expected to utilise ICT in their classrooms even though the resources and training available to them were variable. Teachers' lack of confidence and pedagogy were two further areas identified in my original study as being in need of development and I suggested that there should be, '... increased interest and involvement by school management and governors' (Amey, 1998: iv). I continue to uphold these suggestions and firmly believe that the success of ICT within primary education is dependent on the attitude of teachers, headteachers and governors within individual schools. To research the attitudes of all of these groups would be too wide in scope. My decision to focus on teachers only has been influenced by my professional background.

In 1997 the newly elected Labour Government launched one of the most ambitious initiatives in education to support training for serving teachers in the use of ICT. The Government announced the allocation of £230million from the New Opportunities Fund (NOF) to increase the expertise of serving teachers in the use of ICT in subject teaching to the level expected of all Newly Qualified Teachers (NQT). McFarlane (2003: 221) considers this initiative to be the latest, and arguably the greatest, in a long line of government policy initiatives aimed at increasing the use of digital technologies in schools, a view with which I agree.

The intention of this initiative was to provide the guidance needed for teachers to improve their competence and confidence in their use of ICT. The funding was provided in response to the Government's consultation paper, Connecting the Learning Society (DfEE, 1997a), in which the Prime Minister stated that education would be his Government's number one priority and that by the year 2002 all schools would be connected to the National Grid for Learning (NGfL). During this time organisations were invited to bid for approval to provide training in ICT for serving teachers in England and Wales. This training would be delivered through

approved training providers to ensure that there would be sufficient capacity for its delivery and that schools would have a choice over the style of training, as well as when to participate in the training. That this training has not been fully effective is commented on in the Office For Standards in Education (OFSTED) report, ICT in Schools the Impact of Government Initiatives Five Years On, where it is noted that teachers' understanding of combining what technology can do and what pupils can do remains the single most pressing need in moving ICT forward (OFSTED, 2004: 8).

The research presented in this study has been given direction and focus by defining attitude as being multi-conceptual, comprising mindset, bearing, perception, philosophy and psychology. The definition of attitude within this study has been influenced by both the Theory of Reasoned Action (TRA) (Figure 1) and the Technology Acceptance Model (TAM) (Figure 2) and developed as being multi-conceptual in nature.

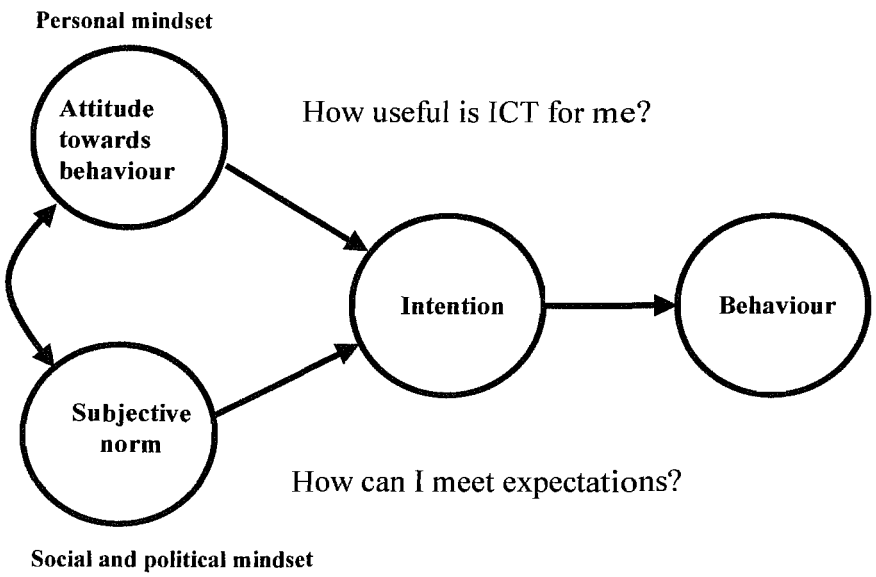

Figure 1 Theory of reasoned action (Ajzen, 1988: 118) - modified

The TRA shows the two components of the external variables of the TAM. Ajzen (1988) states that attitudes towards behaviour are personal and the subjective norm is, '...the person's perception of social pressure to perform or not to perform the

behaviour under consideration' (ibid.: 117). With regards to this study, in the TRA, I have situated personal attitudes towards behaviour around the question, 'How useful is ICT to me?' and defined this as ***'mindset'***. With regard to subjective norms, these may be defined as how personal, social and political issues impose on teachers' attitudes to ICT- summarised here as, 'How can I meet expectations?' and defined here as ***'bearing'***. Both mindset and bearing are combined as the external variable elements of the TAM.

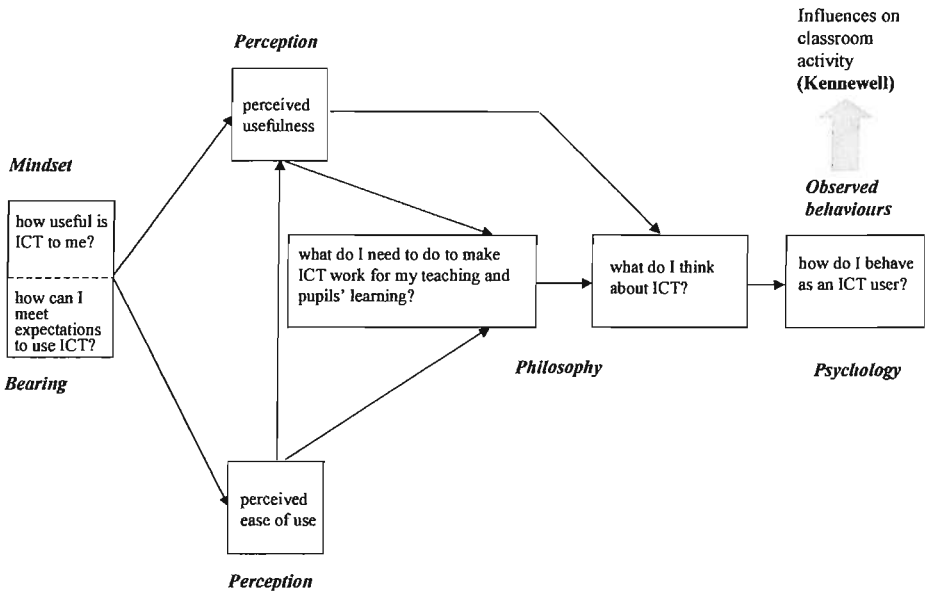

Figure 2 Adapted technology acceptance model (TAM)

I consider the TAM to be linear in nature and effectively producing a sequence of concepts of attitude. Once an initial mindset and bearing are established the next step of the sequence becomes perception. The 'perceived usefulness' and 'perceived ease of use' components of the TAM as Davis et al. (1989) suggest are, 'jointly determined by the person's attitude' (: 985). ***Perception*** in this study is defined by identifying if teachers can see what ICT can do in their teaching and are aware of what commitment they have to make to its use. Moving along the TAM processes we come to the way teachers think about how and what to do with ICT with regard to their classroom pedagogy. Investigating teachers' attitudes towards ICT use and their behavioural intentions towards it provides an opportunity to find out what they think about ICT, in other words their ***'philosophy'***; the basic

concepts of their beliefs, causalities and realities. The final component of the process is how teachers behave as ICT users. In this study the observation of teachers' behaviour has been assigned the term ***psychology.*** Observing teachers' behaviour with and towards ICT within the classroom can provide a visible manifestation of their attitude towards it. Kennewell's (2001) progressive improvement model was adapted for the observation method of data collection. Interpretation of teachers' attitudes, by considering these concepts of attitude, can provide an insight into their use of ICT in teaching and learning.

Each of the five identified multi-conceptual elements of attitude were allocated the following characteristics:

- how personal/political/social issues **impose** on teachers' attitudes to ICT - mindset
- the **influence** ICT has on teachers - bearing
- teachers' **awareness** about ICT - perception
- teachers' **thinking** regarding ICT - philosophy
- teachers' **behaviour** as ICT users - psychology

The development of the five multi-conceptual elements of attitude and their characteristics guided the development of the qualitative research instruments, namely interview, observation and questionnaire. I chose qualitative methods for the research as the principal element was to identify attitudes which are much more difficult to ascertain through quantitative techniques such as survey for example, as there is less opportunity to capture the multi-faceted nature of attitudes or to delve beneath the surface of stated attitudes. The aim of this research is to explore the multi-conceptual elements of attitude, with a sample group of teachers, focusing specifically on their values and priorities regarding ICT; their confidence and knowledge to use ICT as educators; their skills, knowledge and understanding of ICT and how it informs their pedagogy; their use of ICT as part of the teaching and learning process and their use of ICT as part of the management process of teaching and learning.

The definition of ICT in teaching and learning in this study is one in which the teacher uses ICT to develop and teach concepts to pupils using the interactivity and multimedia of ICT. It also includes teaching through ICT where pupils learn with ICT through a range of available applications and peripherals; the teaching of ICT skills to pupils and the use of ICT as a presentation tool.

The sample group of teachers worked within schools ranging from small rural to city centre and within Key Stages 1 and 2 (ages 5- 11). The rationale for selection was that the teachers had either undergone NOF training or had completed NQT training after 1999. This cut off point was to ensure that the sample group had all achieved the expected outcomes for the NOF ICT training initiative. This sample reflected my decision to work with teachers in schools which had developed their ICT equipment and practice without being involved with business funded 'models' and support.

Outline of chapters

Following this Chapter 1, Chapter 2 presents the literature review starting from 1997 when the new Labour Government's innovative ICT initiative was introduced. The chapter informs and contributes to the discussion and developments in pedagogic knowledge and other influences on teachers' as ICT users. Other research studies are also included to situate this research in the wider picture of ICT in primary education.

Chapter 3 offers a brief account of some of the significant initiatives leading up to the intent to advocate increased use of ICT in 1997. They provide a background for the research, examining as it does a facet of ICT in primary education.

Chapter 4, the methodology chapter, outlines the design of the research and shows how it evolved from a pilot study to a framework for the main study. The features and components of qualitative research are identified and the methods by which internal validity and rigour are assured are outlined. The rationale for the research instruments namely, interview, observation and questionnaire is outlined, the

process of how they were employed and the data were analysed. The ethical dimensions of the research are also discussed.

Chapter 5 presents the analysis, interpretation and findings within the research framework and Chapter 6 an overview, summary and conclusions. The findings are explored and the research question is answered within the context of the multi-conceptual definitions of attitude. As a result of the analysis a new model for teachers' continuing professional development (CPD) with ICT is presented and explained. Suggestions for further research are also made which if pursued, may add to the understanding of teaching and learning with ICT in primary education.

Chapter 2 Literature review

2.1 Introduction

This chapter presents a review of literature relevant to this study and situates it within the context of educational research as applied to ICT within primary education. The focus is to consider ICT in this situation with the principal purpose to set the research within a contextual framework of elements that may shape teachers' attitudes to ICT in teaching and learning. A secondary purpose of this literature review is to, '...provide the reader with an overall framework for where this research fits in the, 'big picture' (Mertens, 1998: 34). The big picture is - ICT in Primary Education - which has been running for more than three decades.

The chapter begins by considering the relevance of the research topic with regard to developments since 1997 and considers whether ICT has influenced standards of teaching. Closely associated are considerations of factors that impinge on teachers' acceptance of and behaviour towards ICT. The position of ICT in primary education is reviewed as are also the developmental aims. A short consideration is given to the political expectations, which colour the environment within which ICT is developing. The developments and current situation of teachers' ICT pedagogy are discussed. From this, indicators of effective pedagogy are identified and presented. The sources of the concepts of attitude relevant to this study are identified.

2.2 The relevance of the research topic

Since 1997 ICT in education has received attention from government bodies together with the associated commitment of significant funds for training teachers. The Government agenda, as made clear by the Prime Minister, Tony Blair, '... is to lift educational standards in Britain to the level of the best in the World. This will mean making the most of technological change' (DfEE, 1997a: Foreword). The NOF initiative was launched with its target to raise the confidence and competence of all serving teachers to teach using ICT by 2002. This initiative, together with the requirement that all NQTs be ICT-literate to a mandatory standard from 1999, has

ensured that teachers in primary schools have had the opportunity to receive ICT training to enable its use in the teaching and learning processes.

The nature of ICT as an independent National Curriculum subject and an enabler renders it analogous to English, in that teachers need to know when and how to use it effectively in all subjects. ICT has an additional dimension in that it comes with 'technological baggage' in the form of the knowledge and skills required by the hardware and applications necessary for its use. These requirements are continually changing due to the developmental nature of the technology itself or as Wegerif and Dawes (2004) refer to as, 'the evolution of the new technology'. Together with the introduction of ICT initiatives, teachers have had to contend with the implementation of The National Literacy Strategy and The National Numeracy Strategy. Even though, 'Particular emphasis should be given to how ICT can support the teaching of literacy and numeracy...' (TTA, 1998: 4) these two subjects may have a higher profile and thus input than ICT. These two strategies are linked with subjects that have national assessment tests and published league tables. Jeffrey (2002) states:

> In the case of education, this means both ensuring a favourable qualitative award from a national inspection service and raising the achievement levels of pupils in national tests to ensure a high position in published tables of educational performance (ibid.: 531).

This is an understandable situation as school funding, popularity and status depends on the school's position in league tables in the 'education market place' (ibid.). Developing children's knowledge, skills and understanding is the aim of the National Curriculum. Osborn et al. (2000) cited in Jeffrey (2002) suggest that most primary teachers support the National Curriculum as well as the raising of pupils' achievement. McFarlane makes a pertinent statement suggesting that what is valued in schools determines what is taught and how teaching is managed. She goes on to state that:

> ...the assessment framework is the most powerful lever that effects change in the schools curriculum - arguably more powerful than statutory curriculum definition (MacFarlane, 2001: 20).

All the time that the existing assessment framework is in place it does not encourage developments that do not have demonstrable and quantifiable benefits or as MacFarlane states, 'This is not a culture in which risk taking is encouraged' (ibid.). However, the expectations that ICT will be used to support English, maths (and science) within the externally assessed framework may provide a greater perceived value to it.

There are a number of expectations regarding ICT in primary education held by a range of people, which include politicians, policy generators, educators and teachers themselves. Some of these expectations can be satisfied by quantitative measures as presented by Charles Clarke, the then Secretary of State for Education and Skills, at the 2004 British Education Training and Technology (BETT) conference. He compared percentages of schools connected to the Internet in 1998 and 2003, computer to pupil ratios over the same period and the average spending per school, however at the same time he conceded that:

> ... it's not enough to get the kit; we have to have the kit, but we also have to have teachers who are trained and confident in using the kit and we have to understand how to use each particular bit of kit in a way which focuses on particular educational standards. (...) Confident as I am, that we can make a real difference, but uncertain as I am about what is always the best way to do it in each particular area, and that's where we have come to (Clarke, 2004).

Clarke's pronouncements have a relevance to this study in that his concern for the future is, '...if we are all to reap the benefits, we must see ICT embedded in teaching and learning and do far more to support teachers to develop the new pedagogies...' (ibid.). Identifying the best way forward will require better understanding of teachers and their relationship with ICT. Clarke's uncertainty regarding how to make a difference may be addressed by developing qualitative measurements to supplement the quantitative measures in use. To this end Kennewell (2003) in a paper presented at a conference at the University of Melbourne, proposes a progressive improvement model for analysis of pedagogical interactions with ICT. In his article, Using Affordances and Constraints to Evaluate the Use of Information and Communications Technology in Teaching and Learning (2001), he provides a design for this model, which involves the analysis

of affordances and constraints. He defines affordances as the attributes of the setting and constraints the conditions and relationships amongst attributes, which provide structure and guidance for the course of action (ibid.: 106). He suggests that the role of the teacher is to orchestrate the affordances and constraints in the setting (ibid.: 107). Figure 3 shows Kennewell's model of influences on classroom activity.

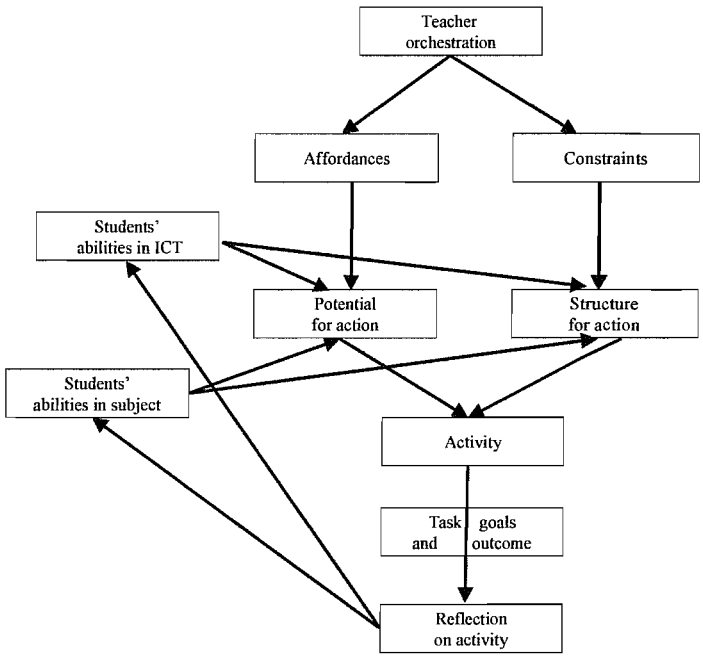

Figure 3 Influences on classroom activity (Kennewell, 2001: 108)

He also states that:

> Rather than make purely quantitative comparison between with/without ICT, or qualitative interpretations of interactions involving ICT, we should combine an interpretative study of the interaction of factors in pedagogical situations with limited measurements of changes in students' abilities. Our aim in applying such approaches is to learn where in the curriculum ICT is best used, and how it is most effectively integrated into different pedagogical environments, styles and strategies (2003).

The implication of Kennewell's proposal is that interactions involving the teacher, student and the resources in a pedagogical situation can be examined to evaluate the effect of different combinations of each. Altering the focus of Kennewell's theoretical model from the assessment of student ability to that of teachers'

behaviours towards their pupils and ICT resources provides the basis for the observation research instrument used in the research reported in this study.

During his BETT speech Clarke also declared the full extent of the Government's financial commitment to ICT in education:

> I believe we have already made significant progress since 1997. The average spending on ICT in primary schools has risen from 68 million pounds in 1998 to 201 million pounds in 2003. In secondary schools it's risen from 143 million in 1998 to 223 million pounds in 2003. We intend to raise ICT spending to over 900 million pounds across all sectors by 2006 (Clarke, 2004).

It is quite feasible that the level of Government investment at the planned level may not continue unless politicians can be reassured that learners are benefiting to an extent which is commensurate with the level of provision (Kennewell, 2003).

It can be said that successful placement of ICT in education is not just about the benefits and success it brings to pupils. There is also the consideration of its impact on teachers and their knowledge of how, where and when to use it in the teaching and learning processes (TTA, 1998). The selection and use of software can have a significant impact on the effective use of ICT (Smeets, 2005; Aldrich et al., 1998). However arguably the most important influence is that of the classroom teacher. The teacher does not function as an isolated entity but is however part of a layered management process within a school. Policies, provisions and guidelines are implemented by and filtered through a number of organisations and people, culminating in varying levels of effectiveness as considered in OFSTED reports on individual schools. At each layer of management there may be varying attitudes and levels of commitment all of which have an influence at the classroom level. The teacher is the effective point of delivery for these initiatives and investments. This study seeks to add to the body of knowledge regarding ICT in teaching and learning from the teachers' perspective.

2.3 Has ICT influenced standards of teaching?

A starting point to answer this question is to review annual OFSTED reports for primary education. These reports are based on schools' inspection data and provide

comprehensive information, regarding standards, on a regular basis. The report for 2000/01 found that there was an overall improvement in the quality of teaching of ICT due in part to the NOF training and improved resources (OFSTED, 2002: 28). The sting in the tail however is that, 'teachers still lack confidence to apply ICT to work in other subjects' (ibid.). These results should be considered in the light of the fact that the NOF training initiative was in its early stages. The 2004/05 OFSTED report draws on data collected from September 2003 to April 2005. The report makes generalized statements concerning teachers' competences namely that:

> Almost all teachers are now confident to teach the National Curriculum in ICT, but many still find difficulties in helping pupils to apply what they have learned to work in other subjects. (...)Many schools have made important progress in their delivery of the ICT programmes of study, but are not yet able to extend this provision by identifying sufficient suitable contexts in other subjects where pupils' ICT capability can be applied, consolidated or extended, or where the use of ICT simply enhances the teaching and learning. This often reflects a culture in which such opportunities - even for straightforward applications - are simply not recognised (OFSTED, 2005, CD-ROM\reportfiles\4.1.6.html)

The issue of the lack of use of ICT in other subjects is still apparent after some four to five years of training availability. Close interpretation of these statements clearly identifies the lack of opportunities for ICT use across subjects by pupils and there is a strong indication that pupil-centred pedagogies are not being developed and practised. Over a period of four years teachers' confidence in teaching ICT appears to have improved to the point where almost all are confident, however the issue of using ICT in subject teaching and learning has not moved forward. Although annual OFSTED reports provide an objective commentary, the criteria for evaluating teachers' confidence to teach ICT may not be the same four years apart. A further point of issue when comparing different annual reports is that the surveyed population will be different in each case. Despite these comments it is of note that there is consistency regarding the issue of teachers' abilities to use ICT in teaching and learning in other subjects. Charles Clarke has intimated that a way forward is not clear. What is clear however is that there is an underlying problem which needs identifying before a solution can be achieved. A potential contributor

to this solution may be that of achieving a better understanding of teachers' attitudes towards ICT.

2.4 Teacher motivators and enablers, resistances, inhibitors and barriers

There are a number of factors that affect teachers' use of ICT which in turn are influenced by social, political and personal issues. Each of these factors is exemplified by a number of issues ranging from personal mindset to institutional policy. Analysis of findings from a number of research studies undertaken in the 1990s, identified by Mumtaz (2000) and Cox et al. (1999a), refer to teacher resistance and inhibitors as factors that affect teachers' use of ICT in their teaching. Cox et al. (1999b: 19) conclude that there are many factors that motivate teachers to use ICT. These include teachers' attitudes to ICT, their beliefs in the value of ICT for teaching and learning and their perception as to whether or not they can use it effectively in their teaching. The motivational factors of attitudes, beliefs and perceptions suggest the fundamentals of a positive approach, central to the integration of ICT into primary education.

Dawes (1999) cited in Mumtaz (2000: 322) discusses how the notion of teacher resistance to change is prevalent in literature concerned with schools and the introduction of new technology. She suggests that teachers use professional knowledge to make judgements about innovations that are educationally effective. In addition she also suggests that teachers take decisions that are intended to confirm their beliefs about these innovations. She implies that rather than resistant, teachers should be considered to be selectively welcoming of suitable change. A differing position is taken by Hammond (2002: 4) who considers that many innovations are not as successful as intended because teachers do not always understand the intentions of the innovations they are expected to carry out and have not had sufficient training in the skills needed to use the technology. Dawes' notion is questionable as teachers lacking in confidence and knowledge of, and skills with, using information and communication technologies may be more likely

to resist acceptance and change to their teaching pedagogy. According to Hammond when pedagogical goals are not made clear teachers might amend the focus of the technology from using it to enhance the curriculum to that of developing ICT skills. Drenoyianni and Selwood (1998) held similar views when they questioned why a teacher is not able to see the word processor as a tool for developing literacy skills but see it purely for developing ICT skills (1998: 97)

Mumtaz (2000) cites a number of studies[1] conducted in the first half of the 1990s that investigated why teachers do not use computers in their teaching. A number of inhibitors emerge which include; lack of teaching experience with ICT, lack of on-site support for teachers using technology, lack of help supervising children when using computers, lack of ICT specialist teachers to teach students computer skills, lack of computer availability, lack of time to integrate technology into the curriculum and lack of financial support.

Cox et al. (1999a: 2-3) found evidence, from previous studies [2] conducted in the 1990s, which show a slow uptake of ICT in schools by the majority of teachers. Some of their reasons for the lack of uptake are identified as; understanding the need for change, questioning professional practice, pedagogical practice verses technical skills, support from whole school, losing control of the controlled learning environment and inadequate resources. All these reasons are valid for the era within which they were investigated, which correspond to the early stages of the introduction of ICT into the National Curriculum. The concept of teachers' losing control of the learning environment and letting their pupils drive their own learning as independent learners may be perceived as a threat by teachers and may have an impact on teachers' attitude towards their acceptance of ICT.

A more recent initial survey, conducted by BECTA (2003), indicates that there are a number of barriers currently identified by teachers with regard to their take up of ICT; lack of confidence, lack of access to quality resources, lack of time, lack of effective training, technical problems, lack of personal access and age. The BECTA survey results provide a more recent picture of perceived barriers than the

Mumtaz and Cox et al. reviews. The results of this survey should however be viewed within the context that it was conducted. The number of participants is small, 170 in all. Furthermore it was conducted at an ICT conference and exhibition and online suggesting that the participants might have both an interest in and competence with ICT already. In this survey the number of responses identifying personal access and age as barriers are less than 5% and 2% respectively. These are insignificant in comparison with the other issues identified.

By analysing each of the factors more rigorously and applying the definitions considered in this section shows evidence of a changing pattern over the period covered by these studies. Considering each of the identified factors in turn, resistance implies a position of personal intransigence and opposition whereas inhibitors may be either or both personal internal or external and suggest a restraint on activity and finally barriers are likely to be principally physical. Of particular note is the decline in the number of perceived barriers and the increase of possible inhibitors as shown in Table 1. The identified barriers can be overcome by financial input however what is surprising are the inhibitors that are identified as lack of effective training and personal access, which questions the quality of NOF training and schemes to provide teachers with laptop computers.

	Resistance	Inhibitor	Barrier
Period during which research was published 1992-1995 (Mumtaz,2000)		•lack of experience	•lack of support •lack of help supervising children •lack of ICT specialist teachers •lack of computer availability •lack of time •lack of financial support
Period during which research was published 1985-1997 (Cox et al., 1999a)	•understanding need to change (1991) •questioning professional practice (1997) •technical skills training with lack of input about pedagogical practice (1988,1994) •losing control of learning		•lack of support from whole school (1991) •inadequate resources
Period during which research was published (Becta, 2004)	•age	•lack of confidence •lack of effective training •lack of personal access	•lack of access to quality resources •lack of time •technical problems

Table 1 Resistances, inhibitors and barriers

A further point raised by Cox et al.(1999b) is that it is likely that,' external and growing pressures will have a greater influence on teachers' use of ICT than the teachers own attitude towards it'(ibid.: 6). Teachers have had to accept many changes to their teaching curriculum during the last decade. They have been required to train for and implement National Literacy and Numeracy strategies with pupils' English and mathematics progress being measured by national standard attainment tests. The nature of these tests position teachers' performance very much in the public arena. The Prime Minister's vision of lifting educational standards in Britain to the level of the best in the world relies heavily on making the most of technology. His belief is that:

> Children cannot be effective in tomorrow's world if they are trained in yesterday's skills. Nor should teachers be denied the tools that other professionals take for granted (DfEE, 1997a: Foreword).

If this vision is to succeed, teachers need to accept and adapt to this change if they are to keep pace with the new technologies and the new pedagogy they bring with them (Wheeler, 2001: 7).

2.5 The position of ICT in primary education

In the same way that information and communication technologies have changed and developed over the last three decades, so too has the need for a different focus on the study of their impact in primary education. Selwyn (1997) suggests that:

> Unlike other areas of educational innovation and change the introduction of the computer into schools had been largely uncontested (...) with any criticism swept under a "utopian" wave of opinion that computers are inherently and unequivocally a "good thing" for education. Whilst a positive approach is not in itself a disadvantage, educational computing research has traditionally suffered from an *excessive* (sic) optimism which permeates the field (ibid.: 305)

Reynolds et al. (2003) use the term *'optimist-rhetoric'* as a way of describing approaches to ICT that they believe influence the thinking of agencies such as the British Educational Communications and Technology Agency (BECTA). Reynolds et al. quote an example given, with regard to primary schools, by BECTA (2002), 'Schools that were judged by OfSTED (sic) to have very good ICT resources had better achievement than schools with poor ICT.'. Reynolds et al. question the causes of 'high performance' by asking:

> Do high performing schools, as a facet of their performance, invest in both the human and physical capital at the cutting edge of school improvement, including ICT, or does investment in the human and physical capital of ICT result in school improvement? Which is cause and which effect? (ibid.: 152).

As they indicate, the effect-hypothesis can be made sense of when considered in the light of teachers' CPD. Harland and Kinder's 1997 study, referred to by Reynolds et al., identifies nine typologies of outcomes. A significant first order typology is that of value congruence where the aims of the training coincide with those of the teacher as:

> It is precisely because of the wide variation in teachers' views about the relative values invested in the curriculum, in different pedagogies, and about what is best for their pupils that *value congruence* as an INSET outcome plays such a significant role in determining the efficacy of most CPD activity (Harland and Kinder, 1997: 74) [3]

It is clear that ICT in education is not solely a matter of the technology although it has become a seductive tool that offers multimedia and interactivity at the click of a

mouse. Teachers can now facilitate their role as educators with multi-sensory resources and have access to virtual teacher centres where they can share best practice. The establishment of the NGfL has provided teachers and pupils with:

> A mosaic of inter-connected networks and education services based on the Internet which will support teaching, learning, training and administration in schools, colleges, universities, libraries, the workplace and homes (DfEE, 1997a: 3).

Against this backdrop Robertson (2002) considers that:

> ...despite initial certainty of political purpose and considerable optimism regarding its effects on teaching and learning, information and communications technology remained, at the end of the 20th century, a marginal force in the education of 5-12 year-olds (ibid.: 404).

In contrast to Robertson's relatively negative retrospective opinion of ICT, Kennewell (2003) suggests that a way to assess the potential of ICT is to allow it to move forward to support and develop classroom practice. He talks about the need to establish a credible case for resourcing ICT and suggests that there needs to be a measurement of the gains that ICT provides over other means of teaching. This suggestion by Kennewell is to some extent in line with the views held by Reynolds. In the preface of the report Primary Schools of the Future-Achieving Today made in 2001 to the Department for Education and Employment (DfEE) by BECTA Reynolds states that:

> Great hopes are held worldwide for ICT, but thus far the research into whether ICT has effects, the appropriate utilisation of it, and 'what works' in terms of the balance between hardware, software and teacher input is an area of more assertion than evidence (DfEE, 2001: Preface).

Both Kennewell and Reynolds seem to imply that the gains ICT provides are not being measured straightforwardly. Kennewell's point regarding ICT and its potential to support and develop classroom practice and Reynold's statement regarding balance between hardware, software and teacher input are directly linked to ICT and pedagogy.

2.6 ICT developmental aims

As previously mention in the Introduction chapter, Government initiatives included training in ICT use for both student teachers and serving teachers. The NOF

training provided the means by which serving teachers could reach a level of expected outcomes based on the Initial Teacher Training National Curriculum for the use of ICT in subject teaching. The salient points of the Expected Outcomes for teachers, include ensuring that they know:

- when, when not and how to use ICT in teaching their subject;
- how ICT can be used in teaching the whole class;
- how ICT can be used when planning, including the use of ICT for lesson preparation and the choice and organisation of ICT resources;
- how to assess pupils' work when ICT has been used; and
- how ICT can be used to keep up-to-date, share best practice and reduce bureaucracy (TTA, 1998: 3)

That five years on, the impact of the government initiative has not achieved what it set out to do is identified by OFSTED:

> The NOF scheme had the laudable aim of promoting teachers' understanding of the pedagogic issues related to ICT use and their identification of what ICT adds or does not add in different learning situations. One important factor that often marks out the most effective use of ICT is the teacher's understanding of what the technology can do, what the pupils can do and how putting these two together can improve teaching and learning. The development of this understanding remains the single most pressing need in moving ICT forward. (OFSTED, 2004: 8)

This report has highlighted the issue of teachers' pedagogical understanding and progression.

Fulfilling the Potential, a paper published by the Department for Education and Science (DfES) in 2003, details the Government's plans for the development of ICT in schools up to 2006 and beyond. The focus of attention is moving from the hardware and software to 'the need for sharper focus on the science of teaching around ICT' (DfES, 2003b: 4). However there is recognition that the vast majority of schools are only beginning to draw on the potential of ICT to enhance teaching and learning. Five points are identified as a way of taking ICT forward in schools. The first two are more general in nature and have been summarised:

1. to develop a comprehensive range of advice, guidance and support for teachers
2. to identify assessment systems that can support effective assessment contributions to teaching and learning

Points 3, 4 and 5 have a more specific focus and relate to the science of teaching or pedagogy.

3. help teachers develop their professional judgement, confidence and competence in ICT to explore its potential for different forms of teaching and learning through a combination of initial teacher training and continuous professional development opportunities sufficiently flexible to suit the needs of individual teachers;
4. help teachers and support staff to get the best out of their non-contact time to enable them to integrate ICT in their planning and delivery of lessons; enable teachers and support staff to make informed choices, including through research, into the materials they choose, supported by practical classroom-focused exemplars of best practice; and
5. help teachers to develop and manage learning beyond the classroom and outside the school day, reinforcing synergies between home, community and the school (ibid.: 8).

These three points focus on the individual and how she/he can grow and develop as a user of ICT. The Government's plans for ICT development in schools is entering into a wider context and going beyond the confines of classroom practice.

The Government proposal for the development of ICT to some extent reflects the model of a conceptual framework for educational practice devised by Alexander (1992: 184) shown in Figure 4.

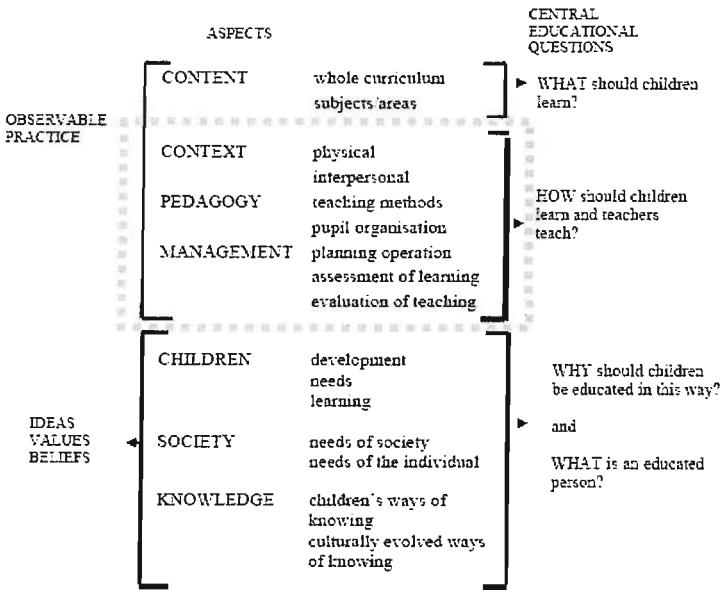

Figure 4 Conceptual framework for educational practice (Alexander, 1992: 184) - modified

Alexander identifies seven interrelated aspects, which fall into two dimensions. First, the observable practice that includes; content, context, pedagogy and management. Second, the ideas, values and beliefs of teachers that include children, society and knowledge. An aspect of this research is to investigate teachers' attitudes to ICT within the bounds of context, pedagogy and management. These are influenced by ideas, values and beliefs and using Alexander's framework pivot around children, society and knowledge. Children's ways of knowing have changed in the last three decades via ICT and will continue to do so to meet the needs of the individual and society. Although in ICT terms 1992 is a long time ago, the features of Alexander's model are still relevant to the e-learning classroom of today. Alexander's conceptual model goes some way to mapping a changing and more complex educational practice that reflects the society and encompasses the knowledge that is required by the children of today in the 'knowledge age' [4]. Teachers' pedagogical approaches need to evolve to encompass both the internal (school) and external (societal) needs of their pupils in line with studies by Granger et al. (2002) and Passey (2000) cited in Leach and Moon (2000: 388). The Government document, Fulfilling the Potential appears to address some of the aspects identified by Alexander.

2.7 Political expectations

This short section considers political expectations, which although not directly affecting pedagogy, do colour the environment within which it is developed. As such, political expectations may be added to Alexander's seven aspects. There are Governmental expectations of improvement in the use of ICT in teaching and learning as indicated by Charles Clarke in his BETT speech. It is extremely likely that these expectations will translate into initiatives for action.

During the last twenty years teachers have been influenced by business methods of management, accountability and practice introduced into the education system (Ball, 2003: 215). Ball points to key elements in what he refers to as the educational reform 'package', which is 'embedded in 3 inter-related *policy technologies* (sic); the market, managerialism and performativity'. He suggests that these new policy technologies play an important part in placing public sector organisations in line with private sector methods, culture and ethical systems. Jeffrey states this succinctly:

> In the case of education, this means both ensuring a favourable qualitative award from a national inspection service and raising the achievement levels of pupils in national tests to ensure a high position in published tables of educational performance. High ratings on these two performativity indicators improve a school's attraction to parents and students in the educational market place (2002: 531).

Political intentions are not solely aimed at the educational market place; the support for business by the introduction of the NGfL and the development of the software and hardware market can be viewed as politically driven. The Prime Minister, identified the potential for providing markets for British companies abroad by pioneering the ICT market at home. The Minutes of Evidence, Annex 4, from the Select Committee on Education and Employment states that:

> It is in the interest of private companies to take part not only of because potential educational sales, but because of the benefits that accrue from investing in a future workforce which is highly ICT literate. In practice, Government is providing the lead in ensuring that the UK is the foremost G7 country in terms of educational ICT (House of Commons, 2000).

It would be misguided to believe that the financial input to support ICT in education is purely for raising educational standards and preparing children to leave, 'school IT -literate (sic), having been able to exploit the best that technology can offer' (DfEE, 1997a, Foreword). Providing business with opportunities to develop and expand worldwide and state of the art technology to education, the link between business and education has taken on a new dimension including standards of accountability and performance.

Ball (2003) introduces the concept of the 'terrors' of performativity to teachers and considers that this process has a significant and negative affect on them (ibid.; 216). The implication of his view is that teachers' attitudes, be they negative or positive, may be influenced by the needs of performativity. There are forms of performance measurement for teachers in the existing appraisal system, which informs their CPD. However Preston (2001: 23) expresses the concern that the lack of support for professional development for teachers who have moved beyond basic ICT skills is suppressing coherent change. NOF training was envisaged as a mechanism to encourage widespread application of ICT in teaching and learning, however in 2005 OFSTED found that there is still a need to raise teachers' understanding of what ICT can do for teaching and learning. Both of these reflections indicate that a change to the pedagogical approach incorporating ICT has still to be satisfactorily achieved.

2.8 Teachers and pedagogy

The term pedagogy is frequently bandied around but as Loveless et al. (2001: 64) suggest, identifying a shared understanding of the word is not straightforward. The standard dictionary definition of pedagogy is that it is the 'science of teaching'. A number of authors (Gibson, 2001, Loveless et al, 2001; Richards, 2006) allude to the changing role of teachers; from 'sage on the stage' to 'guide on the side' indicating that teaching is developing into a collaborative social construct where both teacher and pupils work together for knowledge, skills and understanding. Webb and Cox (2004) imply that:

> ...ICT should be elucidated within a broad framework of educational practice. (...) what can be observed in the classroom is only part of educational practice (ibid.: 236-237).

Education is now fully embedded in the 'knowledge age' and for teachers to respond to the requirements that come with it, the construct of their pedagogic knowledge has to evolve.

> Teachers need to be able to make informed and imaginative decisions about how the curriculum and the teaching strategies which children encounter in schools enable them to become critical and creative participants in a 'knowledge age' not passive consumers of 'information' Loveless (2002: 8).

Trilling and Hood's categorisation of the 'Seven Cs' (Appendix 1) cited in Loveless (ibid.) identifies the skills required by pupils for the knowledge age. Teachers need to adapt to change to keep pace with the new technologies and the new methods of teaching they bring with them (Wheeler, 2001: 7). They need to realise that ICT has to be grounded in, rather than merely be an'add-on' to pedagogy (Richards, 2006). Teachers need to create learning environments where ICT may function as a facilitator of active learning and higher order thinking skills (Smeets, 2005: 345). They also need to create environments where children develop their understanding of ICT systems and processes as well as the skills to use them. ICT is now embedded in the National Curriculum but less so in the practiced curriculum. Webb and Cox (2004) advocate that:

> ...identifying ICT related pedagogies will require examining teachers' ideas, values, beliefs and the thinking that leads to observable elements in practice (ibid.: 236-237)

Loveless et al. (2001: 69) suggest that there needs to be recognition of the role of teachers' beliefs regarding the place and purpose of ICT. Teachers need to assess the impact of technology use on their own beliefs as to how best to teach (Gibson, 2001). In line with this view, Webb and Cox (2004) suggest that teachers' beliefs about teaching and learning are linked to what they do in the classroom and the choices they make in selecting how to integrate ICT into their teaching (ibid.: 237).

Gibson (2001) poses a question regarding change, 'Why is it that achieving any new paradigm of teaching and learning is so difficult?' (ibid.: 40). He suggests that the adoption of any new approaches to teaching and learning are slight compared to change in the outside world. He further states:

> The way people access, work with, and communicate information is fundamentally different than a decade ago. Yet, for the most part, the way we structure learning today is much as it was 5 or more decades ago! (ibid.)

A partial answer to Gibson's question may be found in Loveless et al.'s (2001) comment that, '... technology does not change practice however people do' (ibid.: 63). Underwood and Dillon (2004) hold a similar view and make a case, '... that ICT effects are difficult to assess in the classroom because technology is generally not a direct cause of change but rather a facilitator or amplifier of various educational practices' (ibid.: 216). The environment or infrastructure that ICT is placed into may or may not be adequate to support and promote the emergence of the beneficial effects of the technology (ibid.). The implication here is that teachers need to understand the teaching environment into which they place ICT and to adapt their pedagogic reasoning and practice to incorporate the new technologies. Richards (2006) discusses the notion of an ICT-supported learning environment involving both pedagogical and technological elements coming together in a convergent and integrated approach. He suggests that in order:

> ...to harness the pedagogical implications of various kinds of ICT infrastructure that are available, these need to be reconciled, approached and understood in terms of *constructivist* (sic) learning principles which not only go beyond conventional *transmission* (sic) models of learning but actively encourage and seek to promote more effective learning (ibid.: 244).

Loveless et al. (2001), express a similar view:

> Teachers need to have an understanding not only of the ways in which information sources can be accessed and used but of the teaching strategies which frame different learning experiences with these sources, from direct instruction to supporting collaborative and collective work (ibid.: 73).

Gibson (2001) describes two teaching approaches, one as being teacher-centred and the other as being pupil-centred. In the teacher-centred classroom the teacher is

dominant and knowledge is transferred through direct instruction. Whereas in a pupil-centred approach learning is a collaborative process, where the responsibility is shared between teacher and pupils. He suggests that in this setting:

> ...technology takes on a vastly different role of a tool rather than a tutor. This general-purpose tool provides learners with access to information, expert communications, opportunities for collaboration, and a medium for creative thought, expression and knowledge construction (ibid.: 142).

In his conclusions, Gibson suggests that both teaching approaches may be viewed as 'equally defensible positions' as the learner and the learning objectives should be the main issue. Fullan and Smith (1999: 5) describe the two teaching approaches as being knowledge instruction and knowledge construction. They also suggest that the two approaches are not incompatible. These two views indicate that teachers should have the knowledge and understanding to select the most appropriate strategy for teaching. Underwood and Dillon (2004) suggest that learning has to be understood within its context for the extent and quality to be made sense of (ibid.: 216). There needs to be a deeper understanding of the pedagogy of ICT in both teacher education and teacher development (Passey, 2006). This would allow for the selection of the most appropriate style of teaching to meet the learning objective. There has to be an understanding of the contextualisation of the learning objective.

Webb and Cox (2004) explain:

> The need for teachers' professional development is clear but enabling teachers to adapt their pedagogical reasoning and practices in response to learning opportunities provided by ICT is likely to be a very difficult and complex process (ibid.: 278).

This statement identifies teachers' pedagogical reasoning (thinking) and practice (behaving) as two fundamental aspects of the change required of them to respond to the learning opportunities provided by ICT. Teachers need knowledge and understanding of ICT so they can identify the affordances of ICT that relate to their teaching objectives, design suitable tasks that make appropriate affordances accessible and respond to their pupils' learning needs in the classroom (ibid.).

McCormick and Scrimshaw (2001) suggest that how teachers teach depends on how they view learning as taking place. If their view is that learning is an individual construction of knowledge then they will focus on individual learners (ibid.: 41). However they suggest that there is a range of views of learning that are appropriate for consideration. Their view is that, '...the ICT community has not kept up to date with those views that emphasise the social dimension of learning' (ibid.). They also suggest that as well as a social activity; learning needs to be considered at a 'community' level. This they define as being for example an occupational group, or represented by a subject (ibid.). Wegerif and Dawes (2004) advocate that learning with computers (sic) is a social activity in which the teacher plays a crucial role. A key point made by them is, '... through the organising work of teachers, the tools ICT offers can be employed to resource and support the long-term learning dialogues of a classroom community' (ibid.: 128). They also consider that children need to understand why and how to talk to one another and that the teacher's role is crucial in this:

> In classroom settings teachers have a crucial role in ensuring that children understand the aims for their work with computers (sic). The way teachers establish learning objectives, convey the nature and purposes of tasks, and create a climate of collaborative enterprise, all make a substantial difference to how well ICT helps children to develop their thinking and learning (ibid.: 131).

These teacher activities contribute to functional pedagogy, which creates affordances for the effective use of ICT. The implication is that teachers need to understand how to create learning environments within which, '...a child is able to access the two most powerful resources people have created - spoken language and new technology.' (ibid.: 133). However, Richards (2006) suggests that in practice:

> ...the actual use of ICTs (sic) reflects the very 'transmission' and 'reproduction' paradigms of teacher-centered (sic) face-to-face learning challenged by the new theories of pedagogy which emphasize the learner-centered (sic) implications of new learning technologies (ibid.: 240).

Passey (2006) offers a perspective on the pedagogic needs of teachers. He suggests that:

> If ICT is to be used effectively by teachers, there needs to be a focus on the affordances that each specific form of ICT provides. Teachers need to know

> how to support the entirety of learning processes across the range of technologies available, or to know those aspects where support needs to be addressed through other methods and approaches (ibid.: 164).

A study conducted by Drenoyianni and Selwood (1998) found that the majority of teachers in their study, when asked about their reason for ICT use in the classroom, identified a computer awareness approach (social rationale) and computer literacy (vocational rationale) (ibid.: 90), however pedagogical uses were also identified. They identify discrepancies between the statements and classroom practice of some of the teachers who indicated a pedagogical approach, who were found to focus on computer skills rather than integrated learning intentions (ibid.: 92). Drenoyianni and Selwood believe that a possible cause for this are the ambiguities contained in official documentation. They reference the National Curriculum of 1995, however similar ambiguities are still to be found in the current National Curriculum document. Within Key Stage 1, for example, the English programme of study for reading for information states:

> ...use the organisational features of non-fiction texts, including captions, illustrations, contents, index and chapters, to find information (DfEE,1999: 46).

The note accompanying this requirement states that, ' CD-ROMs and web pages include icons, hotlinks and menus' (to find information) (ibid.). In this case there is definitely a dilemma for the teacher to choose between developing reading for information skills or ICT functional operational skills. Drenoyianni and Selwood (1998) consider that, '...the difficulty of achieving such a goal for those following a pedagogical rationale is evident' (ibid.: 97). Loveless (2003) believes that their study raises questions about possible confusion in official documentation and guidance, ' indicating a lack of consensus and understanding of a conceptual framework for ICT in education' (ibid.: 315).

Does there need to be improved and increased guidance within the National Curriculum with regard to the integration of ICT into subject teaching? Leach and Moon (2000) take a critical stance regarding the suggestions for the integration of ICT in the National Curriculum. They propose that many of the suggested

activities are no more than just opportunities for teacher talk and class discussion (ibid.: 389). They suggest that the identified opportunities are, 'at best random, at worst banal and inconsequential' (ibid.: 390). They decry the 'lack of rigour' and suggest that it is a serious issue especially within the light of the Teacher Training Agency (TTA) requirements for NQTs to have reached a range of standards with regard to the use of ICT in planning, teaching and assessment (ibid.). These expectations also applied to all serving teachers who also were expected to be secure in these standards by 2002. Leach and Moon (2000) are condemnatory regarding the lack of a model for planning, in both the National Curriculum and accompanying schemes of work, for teachers to use ICT (ibid.: 393). Richards (2006) suggests that:

> ...traditional design formats do not lend themselves to effective ICT integration. A traditional lesson plan format will allow the use of *PowerPoint* (sic) as a substitute for chalk and talk (...) and for multimedia programs for either drill or practice learning or to illustrate a topic such as the human body or the solar system (ibid.: 249).

Richards defines traditional lessons as being linear and hierarchical where practical activity, examples or illustrations and learner reflection or application, tend to be seen as 'add-on' rather than primary or integral aspects of learning (ibid.). Teachers who are innovative and creative in their teaching pedagogy may be able to use these aptitudes by using the technologies effectively to interact with their pupils in interactive tasks. The less creative and less confident may continue with a computer awareness approach to ICT in teaching and learning. Richards considers that teachers:

> ... do not need to have advanced technological proficiency (perhaps, on the contrary) in order to be good designers for ICT integration in learning. But they do need to have a sufficiently competent basis for the kinds of balanced yet innovative 'visions of possibility' needed to proactively implement and integrate new ICT tools...(ibid.: 251).

What Richards is implying here is that if a teacher possesses a pedagogical understanding of effective teaching they can have the capability to incorporate new ideas, including those of ICT, into their practice.

A number of studies have focussed on pedagogy incorporating ICT where the sample groups have been deemed to be engaging in innovative pedagogical practices. One such, conducted by Moseley et al. (1999) based at the University of Newcastle and commissioned by the TTA, was to undertake research into effective classroom pedagogy using ICT in primary schools. Their sample group consisted of teachers who were achieving average or above average gains on 'measures of relative attainment' by pupils. The aim of their research was to help teachers enhance their pedagogy by increasing their capacity to make professionally based choices about when, when not and how to use ICT in their teaching, and to understand the implications of using it. One of their findings was that teachers who choose to use ICT are likely to, 'have well-developed ICT skills themselves and see ICT as an important tool for learning and instruction' (ibid.: 6). They are also likely, ' to value collaborative working, enquiry and decision-making by pupils' (ibid.). Moseley et al. found that teachers' thinking and beliefs about teaching and learning are linked to what they do in the classroom and affect the choices they make (ibid.: 65). They suggest these are made more complex by the relationship with ICT, which itself demands both personal and pedagogical technical skills and competence (ibid.: 47). This view is not in concordance with Richards' views regarding advanced technical proficiency.

A later study conducted in Canada by Granger et al. (2002) investigated the factors that contribute to teachers' successful classroom implementation of ICT. The schools in their sample were selected on the basis that they were deemed to be engaging in innovative pedagogical practices using technology. There are two interesting and illuminating findings revealed in this study. The first being that,

> ...the teachers in this study not only sensed how computers, used judiciously, might augment both tangible and intangible rewards of all kinds, but were prepared to engage in practical and theoretical work of determining wise and appropriate use (ibid.: 484).

The second is that while there is no single sufficient condition for success with technology, Granger et al.'s data reveal a set of necessary conditions that they summarise as computer, commitment and community:

> These findings suggest that the relationship between teachers' ICT skills and successful implementation is complex and not obviously predictive: attitudes, philosophies, communication, and access to skills training are also contributing factors, which both inform and are implicated in the notion of *commitment* (sic). The teachers were engaged in *teaching technology* (sic) and in the practical and theoretical work of *thinking about technology* (sic) in ways that informed their practice. They were committed to student learning, to finding creative ways to implement technology, and to an ongoing critical inquiry into all aspects of ICT that was grounded in a further commitment: serving the needs of the larger communities from which their students came and to which they returned after the school day (ibid.: 487).

Granger et al. identify community as being both external and internal to the school. External community in their study includes such elements as equity, language, privilege and community support with philosophies of pedagogy informed by the characteristics of the community. Internal community is manifested in collegial support, collaborative learning and administrative encouragement. By combining the needs of the external and internal communities the schools in the Granger et al. study successfully 'unite the interests of the individuals and the communities they serve' (ibid.: 488).

Leach and Moon (2000) suggest that teachers not only work with learners but also are learners themselves. Their major premise is that,

> ...learning is a situated, social process, dependent on interaction and communication (Bruner, 1996); such learning is ongoing and takes place in a wide variety of communities and across a range of settings. A primary interest, therefore, is with the conception, construction and practice of learning communities...(ibid.: 394).

They propose that one of the strengths of a situated view of learning is that it encompasses a range of settings, impacted on by the wider school and community as well as taking into account the role outsiders can play. They suggest the idea of 'learning communities' is increasingly important especially with the increasing importance of the communications aspects of ICT. As a result, teachers' pedagogic practice is considered to be 'subject to multiple influences' (ibid.). These influences widen the concept of teaching and learning within the classroom and therefore pedagogic practice.

2.9 Indicators of effective pedagogy

Leach and Moon (2000) in exploring pedagogic practice use two organising categories: the pedagogic arena, which they define as the broad context in which learning activities take place and the pedagogic setting where the actual practice of applying pedagogic knowledge to the learning process takes place. When discussing the pedagogic arena they suggest that it can exist in a variety of sites and levels. Teachers can bring their own arenas to life (ibid.: 394). The following identified elements, from the literature, are those that can contribute to teachers' activities in the creation of their pedagogic arena. It is where they:

- consider their pedagogic reasoning (thinking) and practice (behaviour) (Webb and Cox, 2004)
- consider the impact of technology on their beliefs (Gibson, 2001; Webb and Cox, 2004; Loveless et al., 2001)
- consider learning environments (Smeets, 2005)
- consider styles of teaching (Richards, 2006; Loveless et al., 2001; Gibson, 2001; Fullan, 1999)
- are prepared to engage in practical and theoretical work of determining wise and appropriate use (Granger et al., 2002)
- develop confidence in using a range of ICT resources (DfES, 2003a)
- use balanced yet innovative 'visions of possibility' needed to proactively implement and integrate new ICT (Richards, 2006)

Teachers and learners create their own particular pedagogic setting, which brings the arena to life (Leach and Moon, 2000).

Banks, Leach and Moon (2005) suggest that the relationship between knowledge and pedagogy is an important one and needs further exploration (ibid.: 332). Their exploration of the relationship between knowledge and pedagogy is formulated on the interrelations of subject knowledge, school knowledge and pedagogy (ibid.: 335). The model shown in Figure 5 represents,

> ...the dynamic relationships between the categories of knowledge implied by the diagram. (...) Lying at the heart of this dynamic process are the

personal constructs (sic) of the teacher, a complex amalgam of past knowledge, experiences of learning, a personal view of what constitutes 'good' teaching and belief in the purposes of the subject. This all underpins a teacher's professional knowledge and holds good for any teacher (ibid.: 336).

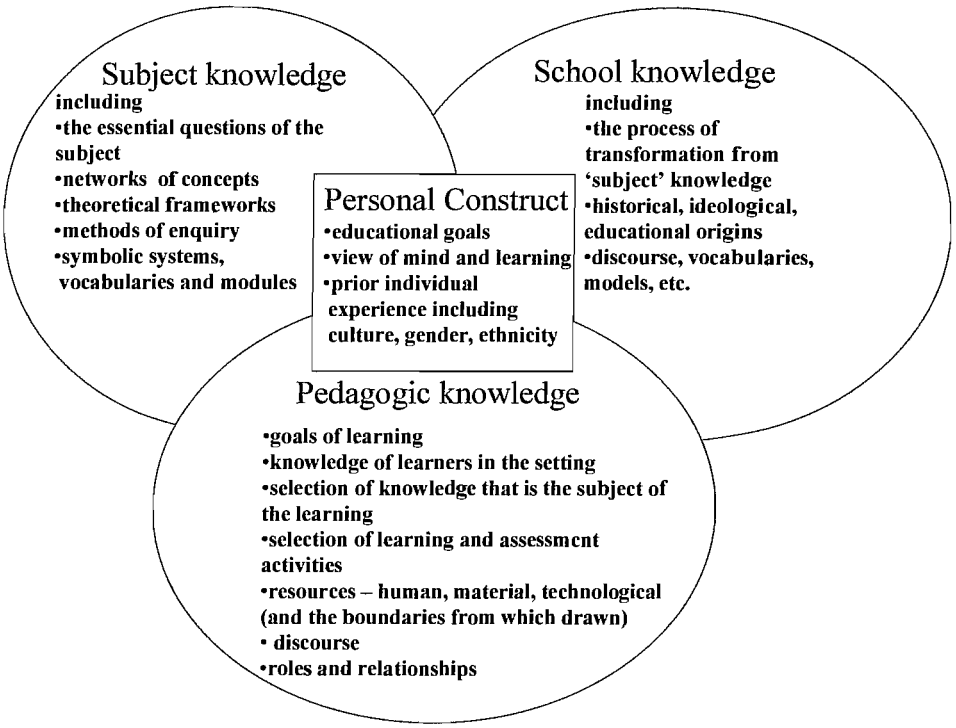

Figure 5 Teacher knowledge used in creating a pedagogic setting (Leach and Moon, 2000: 396)

Interpreting the descriptions of subject, school and pedagogic knowledge given by Banks, Leach and Moon (2005) provides a definition of the core relationship between the three types of knowledge.

- subject knowledge - the dynamic process that takes in the methods relating to a subject. These include the essential questions, the methods of enquiry and their frameworks and supporting vocabulary
- school knowledge - principally the transposition of the subject within the context of the affordances and constraints offered by the school for the particular subject
- pedagogic knowledge - the beliefs and practices that inform teaching and learning and an understanding of the relationship between subject knowledge and school knowledge (ibid.: 335-336)

How the teacher applies their pedagogic knowledge relates to their effective classroom pedagogy. Column 1 in Table 2 lists the aspects, identified by Leach and Moon, which categorise teachers' pedagogic knowledge. Column 2 identifies activities (extracted from the literature) relating to the aspects and how they are realised in the classroom. The following identified aspects are those that contribute to teachers' activities in the pedagogic setting reflecting their own perceptions of their core task of teaching and learning. This identified range of practices can contribute to teachers' effective use of ICT in the classroom.

Aspects of teachers' pedagogic knowledge (Leach and Moon, 2000: 396)	**Realisation of teachers' pedagogic knowledge in the classroom**
1	2
goals of learning	• know the intentions and the rationale of the educational encounter (McCormick and Scrimshaw, 2001) • know pupils need to understand the aims of their work with ICT (Wegerif and Dawes, 2004)
knowledge of learners in the setting	• collaborative, shared responsibility for learning between teacher and pupils (Granger et al., 2002) • recognise which kinds of class organisation will be most effective for particular learning tasks with ICT (DfES, 2003a) • know how to prepare and plan lessons where ICT is used so as to challenge pupils' understanding and promote greater thinking and reflection (DfES, 2003a)
selection of knowledge that is the subject of the learning	• know learning has to be understood within its context for the extent and quality to be made sense of (Underwood and Dillon, 2004) • appreciate that some uses of ICT will change the ways in which knowledge is presented (DfES, 2003a)
selection of learning and assessment activities	• create environments that promote and support active and autonomous learning (Smeets, 2005) • create environments where pupils can access spoken language and technology (Wegerif and Dawes, 2004) • promote ICT function as a facilitator of active learning and higher order thinking skills (Smeets, 2005) • develop assessment to include acquisition, comprehension and concept formation (Passey, 2006) • make professional choices of when to use ICT and when not to use it in their teaching and to understand the implications of their choice (Moseley et al., 1999)
resources – human, material, technological (and the boundaries from which drawn)	• understand the relationship between a range of ICT resources and the concepts, processes and skills in their subject (DfES, 2003a) • use subject expertise to select appropriate ICT resources to meet specific learning objectives (DfES, 2003a)
discourse	• understand the speech and actions in the norms and behaviours of the classroom (McCormick and Scrimshaw, 2001) • employ ICT tools to resource and support the long term dialogues of the classroom (Wegerif and Dawes, 2004)
roles and relationships	• know who controls the learning and the extent of collaboration among learners (McCormick and Scrimshaw, 2001)

Table 2 ICT pedagogy in the pedagogic setting

The guidelines contained in the document, Fulfilling the Potential, move beyond the confines of the classroom. However the reviewed literature concerning pedagogy and effective pedagogy has indicated that 'the sharper focus' (DfES, 2003b: 4) sought by the DfES document is not being fully addressed by their guidelines.

2.10 Attitude, teachers and ICT

The aim of this qualitative study is to identify the ICT-related attitudes of a sample group of primary school teachers and for that reason it is necessary to develop a position on what is meant by attitude when used within this study. The following definitions of attitude, by both Ajzen and Chronbach, suggest a measurable value towards an object and go beyond the approach taken in this study, which is qualitative in nature. Ajzen (1988) comments that many social psychologists[5] consider that attitude is evaluative in nature whereby individuals respond negatively or positively to the attitude object (ibid.: 4). Ajzen considers attitude to be a '...disposition to respond favorably (sic) or unfavorably (sic) to an object, person, institution, or event' (ibid.). However, Cronbach (1977) expresses the view that attitude is an interpretation a person makes regarding the value of an object or concept (ibid.: 739). Ajzen's use of the word disposition suggests inclination or disinclination to respond to an object whereas Cronbach's use of the word interpretation suggests the individuals' understanding and judgement about the value of the object. In this study the object for the sample group of teachers is ICT in teaching and learning.

Ajzen (1983) suggests that in the TRA (Figure 6) intentions are determined by personal and reflective social influences (subjective norms) (ibid.: 117). He determines that, '...we must try to understand the determinants of behavioural intentions.' (ibid.: 116) by identifying the personal and social considerations that influence intentions. The function of the TRA model is to show how personal factors (attitude towards the behaviour) and social influences (subjective norms) influence intentions and subsequent behaviours.

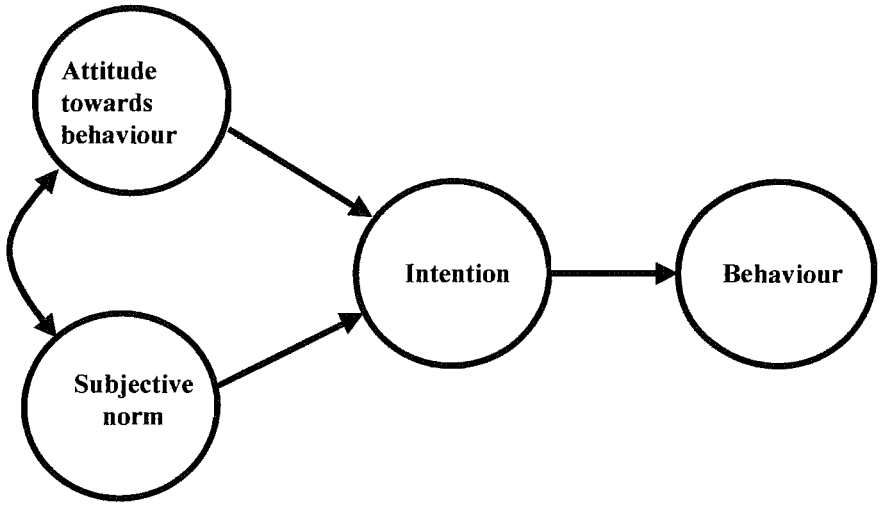

Figure 6 Theory of reasoned action (Ajzen, 1988: 118)

Davis et al. (1989) in a paper entitled, 'User Acceptance of Computer Technology: A Comparison of Two Theoretical Models' explain the major characteristics of the TRA model as developed by Fishbein and Ajzen (1975: 16). Davis et al. (1989: 983) suggest that the TRA is a widely studied model from social psychology and is concerned with those factors that influence consciously intended behaviours however it is general in nature. Figure 7 shows the TRA model from which Davis, in 1986, introduced the TAM shown in Figure 8 which is '...specifically tailored for modelling user acceptance of information systems (Davis et al., 1989: 985) and '...to explain computer usage behaviour (ibid.: 983).

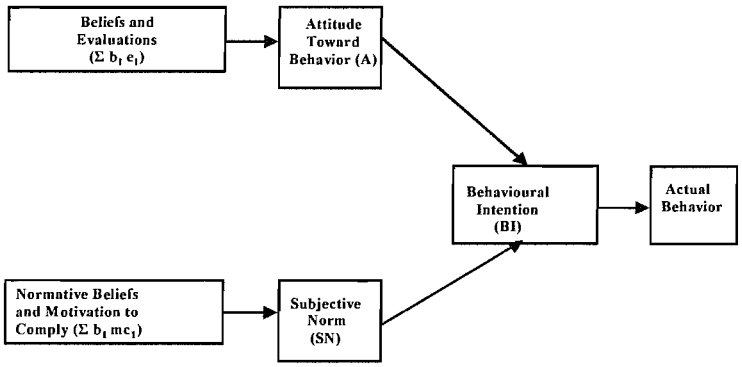

Figure 7 Theory of reasoned action (Davis et al., 1989: 984) (developed from Fishbein and Ajzen, 1975: 16)

Information systems is the term generally used within business and is directly analogous to the term ICT in educational parlance. Although the TAM was developed for use in business it can be equally applied to education as, 'A key purpose of TAM, therefore, is to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions' (Davis et al., 1989: 985).

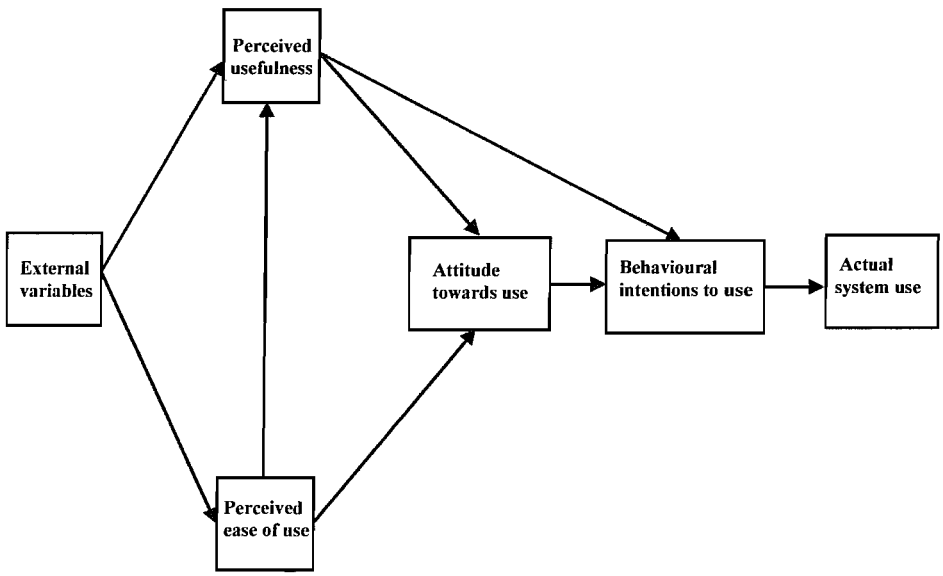

Figure 8 Technology acceptance model (TAM) (Davis et al., 1989: 985)

Research, conducted by Cox et al. (1999a) for the MirandaNet Project, set out to investigate factors that support or prevent teachers from using ICT in their classrooms. Their research is founded on the TAM and investigates perceived ease of use and perceived usefulness, which are only two elements of the model. This study is complementary to Cox et al.'s work but goes beyond theirs in that it takes into account all the elements of the TAM. The elements of the TAM have influenced the development of the five multi-conceptual elements of attitude used in this study and their development has been explained in the Introduction chapter.

2.11 Summary

ICT is becoming increasingly important in primary education. This is recognised by the amount of Government investment provided with the intention of raising teachers' use and effectiveness of ICT in teaching and learning. OFSTED comments indicate that there are still areas for improvement relating to ICT and pedagogy. Fulfilling the Potential, a paper published by the DfES in 2003 details the Government's plans for the development of ICT in schools up to 2006 and beyond.

This literature review has identified that the standards of teaching with ICT is still affected by teachers' lack of confidence regarding its use in subject teaching. The motivators and enablers, resistances, inhibitors and barriers that have affected teachers' relationships with ICT, over time, have changed. Where previously physical barriers were most significant these have now been supplanted by more personal needs and feelings. Indicators have been found to suggest that the gains ICT provides are not being accurately assessed.

The development of ICT and teachers' pedagogy is based on a number of elements, including the need to understand the teaching environment where ICT is placed. The need to adapt pedagogic reasoning and practice incorporating ICT is influenced by not just what happens in the classroom but also the wider environment. It has been shown that official documentation, such as the National Curriculum, is lacking in some aspects of practical guidance. The literature on pedagogy provided indicators that suggest constituents of effective ICT pedagogy.

The concepts of the TRA and the TAM provided the basis for the development of the multi-concepts of attitude used in this study. The next chapter provides a brief historical background to the research topic.

Footnotes

[1] *Rosen & Weil (1995); Winnans & Brown (1992); Dupage & Krendl (1992); Hadley & Sheingold, (1993)*

[2] *Cox, M. J. (1993); Cox, M. J., Rhodes, V. and Hall, J.(1998); Watson, D. M. (ed) (1993); Woodrow, J. (1990)*

[3] *INSET: a standard term used to describe teachers' in-service training*

[4] *A term originating in the USA, used to describe the period from 1991 onwards when spending on information technologies exceed spending for industrial-age capital, such as engines, machinery and industrial equipment. (Stewart, 1997, cited in Trilling and Hood, 1999,cited in Loveless. A. and Dore, B. (2002)*

[5] *Bem, D. (1970); Edwards, A. L.(1957); Fishbien, M. and Ajzen,I. (1975); Hill, R.. J. (1981); Osgood, C. E., Suci G. J. and Tannenbaum, P. H, (1957); Oskamp,S. (1977)*

Chapter 3 Background to the research topic

3.1 Introduction

This short chapter provides a brief historical background for the research reported in this study. It presents a timeline of significant initiatives that have taken place regarding the introduction of information technology (IT) into primary education since 1979. The position taken in this chapter is not to discuss the merits of the initiatives identified, however the purpose is to show that the introduction of IT (ICT) has been undertaken across three decades. In the late 1990s IT became ICT.

3.2 Developments from 1979-89

Selwyn (2002) suggests that the period between 1979-89 witnessed the entrenchment of the popular perception of the computer as inherently 'educational' (ibid.:429). Government strategies to develop an educational computing programme (ibid.: 430) were supported by centrally funded initiatives (ibid.:431). In Selwyn's view the most notable of these was the Micros (microcomputers) for Schools scheme launched in 1981 by the Department for Trade and Industry (DTI). Fothergill (1988) suggests that, 'The technology was an innovation...which offered teachers and children a whole new approach to teaching and learning...' (ibid.: 305).

1980 saw the establishment of the Microelectronics Education Program (MEP) sponsored by the government for a period of five and a half years. Within a broad remit, '...the Programme set out to explore the possibilities offered by microelectronics and prepare a launching pad for the future (ibid.). Selwyn's (2002) view of this programme was that in practice, '...the MEP entailed the dissemination of information, curriculum and software development and teacher training' (ibid.: 431). In 1986 further funding was made available for the development of the Microelectronics Education Support Unit (MESU) with the brief to consolidate the work of its predecessor (MEP) by continuing to support the integration of IT into the curriculum. In 1990 the National Council for Educational Technology (NCET) took on the mantle of its predecessor MESU, and continued to support the development of IT in a non-statutory manner. During the 1980s the

DTI continued to provide funds for the purchase of hardware and software or as Selwyn succinctly refers to this as '...'bankrolling' of educational computing...' (ibid.).

3.3 The National Curriculum and IT

The Education Reform Act of 1988 provided the statutory framework for the introduction of a National Curriculum in England and Wales. IT was included with technology and was viewed in the National Curriculum Council's Curriculum Guidance 3 '... as a cross-curricular skill and should be taught as an integral part of most foundation subjects in primary and secondary schools' (National Curriculum Council, 1990). This presented all primary teachers with the responsibility for:

- using IT to enhance learning;
- developing each pupil's IT capability in accordance with school policy;
- ensuring that each pupil has access to IT resources;
- monitoring and evaluating pupils' experiences;
- determining the next stage in each pupil's use of IT, and ensuring continuity and rigour;
- contribute to each pupil's record of development (ibid.: Appendix).

The status of IT as a curriculum subject or tool for learning lacked clarity, as is exemplified by an NCET report, released in 1993, which suggests:

> There is still uncertainty within education about whether I.T. (sic) is a subject, a learning tool or a core skill, and greater clarity needs to be established about the roles and purposes of I.T. in the curriculum (NCET, 1993: 22).

The same report also provided a foundation for the continuing debate on the future vision of IT:

> ... that there is a tension between visions of what could be achieved through a curriculum supported by I.T. (sic) and what is currently achieved. This is attributable partly to a lack of a shared vision and partly to practical difficulties in implementing elements of particular visions. It seems probable that visions of the future will only be realised through a process of discontinuous change. Such a process will need to be driven by policy-makers at all levels (ibid.: iv).

Attention was also drawn to the need for future curriculum revisions to reflect the new skills, knowledge and understanding that come with the development of IT in education. A further point made was that the National Curriculum would need to

be continually reviewed to keep it in line with a vision of learning for the future (ibid.: iv). In 1995 the Dearing Review of the National Curriculum changed the status of IT. The delivery and assessment of IT was separated from that of technology and three key aims were identified:

- developing children's individual IT capability;
- enhancing learning in other areas of the curriculum;
- learning IT skills specified within other National Curriculum Orders.

(SCAA, 1995: 2)

3.4 New Labour, new way forward

Shortly before coming to power in 1997 the Labour Party requested an independent inquiry, chaired by Dennis Stevenson. Its brief was to examine the potential of information and communications technology in schools. Two key issues dominated its conclusion these were,

> ...the state of ICT in our schools is primitive and not improving' and also that it was a, '...national priority to increase the use of ICT in our schools'. Within the first conclusion was also the finding that, 'The experience, skills and even attitudes of teachers vary widely (Stevenson, 1996/1997: 6).

It is important for educational planners and policy makers to be aware of teachers' computer related attitudes and to understand the issues that have a bearing on these and the effective use of computers (Katz, 1996: 24).

The White Paper 'Excellence in Schools' (DfEE, 1997b), built on the Government's manifesto commitment to ICT in education, put forward key proposals namely:

- better training for existing teachers to make sure all use the most effective methods of teaching, focused in particular on literacy, numeracy and IT
- better developed information and communications technology within a clear strategy
- schools linked to a National Grid for Learning (NGfL) providing modern teaching and resource material supported by initiatives such as NetDays. Appendix 2 contains a more complete version.

The document, Connecting the Learning Society (DfEE, 1997a) is considered by McFarlane (2003), '...to be arguably the greatest initiative designed to increase the

use of information and communication technologies in schools' (ibid.: 221). It details the Governments proposals, '...to bring about our vision of a Learning Society' (.DfEE, 1997a: 4) through the development of the NGfL. Selwyn (2000) suggests that the NGfL, '...is best seen as an umbrella term or 'brandname' (sic) for the government's various programmes concerned with integrating ICT into schools...' (ibid.: 408). These he effectively condenses as being:

> The tripartite focus of the NGfL is therefore on: *infrastructure* (i.e. hardware/connectivity to the Internet); *content* (i.e. educational software and online content); and *practice* (i.e. teacher training and subsequent use of ICT by teachers and learners) (ibid.).

In Connecting the Learning Society, the Prime Minister stated his Government's beliefs and actions for education and technology:

> Technology has revolutionised the way we work and is now set to transform education. Children cannot be effective in tomorrow's world if they are trained in yesterday's skills. Nor should teachers be denied the tools that other professionals take for granted. (...) ...half a million teachers will be trained; and our children will be leaving school IT-literate (sic), having been able to exploit the best that technology can offer (DfEE, 1997a: Foreword)

The sum of £230 million was made available from April 1999 for a period of three years to fund training for both teachers and school librarians in their use of ICT. The purpose of the training was to:

> ... focus on the use of ICT in the classroom and the training will be integrated, where relevant, with training in generic ICT skills. Wherever possible, training will take place within the classroom, so that teachers can try things out as they learn (TTA, 1998: 3).

Selwyn (2000) welcomes the monetary commitment however he suggests that:

> ...merely relying on £500 for training up until 2002 may be far less than is required to get all of the country's 450 000 teachers 'confident and competent' with ICT as one of the NGfL targets explicitly states, (ibid.: 409).

The state of primary teaching in England is conveyed through Annual OFSTED reports. Towards the end of the three-year funded training, the OFSTED report for the year 2000/01 found that, '...many teachers still lack confidence to apply ICT to work in other subjects (OFSTED, 2002: 28). It was also reported that teachers' subject knowledge was found to be weakest in ICT (ibid.: 28) compared to the

other National Curriculum subjects and that the quality of teaching for the subject of ICT was:

Excellent/Very Good.....5%
Good.....42%
Satisfactory.....41%
Unsatisfactory/Poor.....12%
(ibid.: 27)

The point for consideration here is to identify and understand the underlying causes of this situation.

3.5 Summary

This chapter offers a brief account of the initiatives leading up to the Government's intent to advocate increased use of ICT in 1997. It provides a background for this study of teachers' attitudes with regard to teaching and learning with ICT. The next chapter details the methodology developed to gather empirical evidence.

Chapter 4 Methodology

4.1 Introduction

This chapter describes the research methodology and design adopted for this study. This is a multi-method qualitative study set within an interpretative/constructivist paradigm. The aim of this study as indicated in the introduction was to identify primary teachers' attitudes towards ICT in teaching and learning and the conditions and factors that inform them. The research question was stated as:

> ***What attitudes do teachers' have to ICT in teaching and learning in primary education and what factors underlie them?***

Identification of teachers' attitudes is investigated under five multi-concepts of attitude within an identified research framework, the development of which is explained in Section 4.5.2.

This chapter begins by locating the chosen methodology within an interpretative approach to qualitative research. Procedures for the collection of empirical data are outlined and justified and the ethical dimension of qualitative research and procedures adopted in this study similarly described. How the research instruments - namely interview, observation and questionnaire - were developed and validated are outlined and procedures for the management and analysis of data using QSR-NVivo explained.

As indicated in the Introduction chapter my interest in the research question stems from my previous research which suggested teachers attitudes make a difference to whether and how they utilise ICT in teaching and learning and my belief that a greater understanding of what these are will improve the use of ICT in primary classrooms. Given my commitment to the topic, it is important that I indicate how I managed to examine any potential bias in the study. This is explored in Section 4.3.2, My 'beliefs' that guide me.

4.2 Qualitative research

According to Denzin and Lincoln (1998c: 3) qualitative research is multi-method in its focus, involving an interpretative, naturalistic approach to its subject matter.

The qualitative researcher studies things in their natural settings, attempting to interpret and make sense of phenomena in terms of the meanings that people bring to them. Denzin and Lincoln define the qualitative research process as three interconnected generic activities behind which stands the researcher. The researcher comes with a personal life history and approaches the world with a set of ideas, 'a framework (theory, ontology) that specifies a set of questions (epistemology) that are then examined (methodology, analysis) in a specific way' (ibid.: 23).

4.2.1 Features and components of qualitative research

> A fundamental assumption of the qualitative research paradigm is that a profound understanding of the world can be gained through conversation and observation in natural settings rather than through experimental manipulation under artificial conditions (Anderson with Arsenault, 1998: 119).

The above description of qualitative research reflects the approach taken in this study. The research was conducted in teachers' own classrooms and schools. Observations were made during 'normal' lessons and interviews were conducted on site. Bogdan and Biklen (1982) define the features of qualitative research (Table 3) and Strauss and Corbin (1998) define the components (Table 4). The features provide the characteristics of this research and the components describe the inputs, actions and results. These features and components set the qualitative parameters within which this study has been designed and conducted. Their application is highlighted in bold in Tables 3 and 4.

Features of Qualitative Research as defined by Bogdan and Biklen (1982: 27-29)	**Features of this qualitative research**
1. Qualitative research has the **natural setting** as the direct source of data and the researcher is the key instrument.	The natural setting for this study is the sample group of primary school teachers' own professional environment and time. All teachers in the sample group are currently teaching in primary schools. In this case the researcher is the sole co-ordinating instrument
2. Qualitative research is **descriptive**.	The data collecting methods used allowed for descriptive responses to fulfil the research framework elements: • teachers' values and priorities regarding ICT • teachers' confidence and knowledge to use ICT as educators • teachers' skills, knowledge and understanding of ICT to inform their pedagogy • teachers use of ICT as part of the teaching and learning process • teachers use of ICT as part of the management process of teaching and learning
3. Qualitative researchers are **concerned with process** rather than simply with outcomes or products.	The aim of this study is to identify teachers' attitudes to ICT in teaching and learning within the context of: • how personal/ political/ social issues ***impose*** on teachers' attitudes to ICT - mindset • the ***influence*** ICT has on teachers - bearing • teachers' ***awareness*** about ICT - perception • teachers' ***thinking*** regarding ICT – philosophy • teachers' ***behaviour*** as ICT users – psychology
4. Qualitative researchers tend to **analyse their data inductively.**	Coding and grouping the data such that similar themes, ideas and concepts are brought together to support synthesis and deduction
5. **"Meaning" is of essential concern** to the qualitative approach.	Use of qualitative measures to identify teachers' attitudes to ICT brings meaning and understanding to the root causes of the state of ICT teaching in primary schools

Table 3 Features of qualitative research defined for this study

Components of Qualitative Research as defined by Strauss and Corbin (1998: 12)	**Components of this qualitative research**
The data - which can come from various sources such as **interview, observation** documentary records and films.	Data obtained by means of interview, observation and questionnaire (qualitative in nature). Triangulation used to bring validity and rigour to data collection and analysis
The procedures – researchers use these to interpret and organise the data: this can be simplified to **conceptualising and reducing, elaborating and relating - referred to as coding.**	QSR-NVivo used to facilitate coding process - attaching nodes (ideas and concepts). Regrouping data into research framework elements
3. **The written report**	Results presented as a research thesis

Table 4 Components of qualitative research defined for this study

4.2.2 The research phases

Denzin and Lincoln (1998b: 24) describe the research process as having five related phases and activities. From their list of activities those used within this study are shown:

Phase 1: The Researcher - the motivations the researcher has regarding the history, research traditions, ethics and politics

Phase 2: Theoretical Paradigms and Perspectives - constructivism

Phase 3: Research Strategies - qualitative multi-method design

Phase 4: Methods of Collection and Analysis - interviewing, observing, questionnaire (not identified by Denzin and Lincoln, but used in this research see Section 4.6.4) data management methods, computer assisted analysis

Phase 5: The Art of Interpretation and Presentation - writing as interpretation

Appendix 3 provides the complete list of research phases and activities as identified by Denzin and Lincoln. These combined phases form the nucleus of qualitative research design and provided a scaffolding to support the chosen method of research investigation.

4.3 Phase1: The researcher

4.3.1 The self as instrument

As an experienced teacher who has grown and developed with computers in primary education and has previously conducted research into the field of ICT for a Masters degree, I bring to this study background knowledge through research and most importantly experience. When I conducted my previous research in 1997/98, successive Annual OFSTED reports, up to and including that year, had included a number of statements to the effect that ICT was not being implemented successfully in primary schools. In my role as ICT Co-ordinator for a school that had received a poor report in this area, I wanted to find out 'how things were being done' in other schools. How were other ICT co-ordinators managing their subject? My previous research focused on processes and looked at potential enablers and inhibitors for implementing ICT from the point of view of the ICT Co-ordinator and did not take into account the attitudes and personal experiences of those teachers who may have viewed computers with trepidation. The findings indicated the need for further research relating to classroom teachers and their relationship with ICT and the potential impact that differing attitudes may have. These findings were supported by my own experience in the role of ICT Co-ordinator and classroom teacher. Between my school's first inspection and the more recent second inspection I had spent a considerable amount of the proverbial 'blood, sweat and tears' motivating, persuading and sometimes directing my colleagues to alter their attitudes and see the value of ICT in teaching and learning.

4.3.2 My 'beliefs' that guide me

One of the main beliefs that guides this research is that the presentation of the in-depth experience of individuals can enhance the way we understand:

> ...the experience of the people he or she interviews in compelling enough detail and in sufficient depth that those who read the study can connect with the experience, learn how it is constituted, and deepen their understanding of the issues it reflects (Seidman, 1998: 44).

My professional background has strongly influenced my belief in the value of ICT as a resource, for both teaching and learning. As mentioned in the Introduction

chapter it is from more than one perspective that I see the possibilities and potential of ICT in the teaching and learning processes. Information technologies have opened a depth and breath of knowledge that can bring the world to the classroom. Communication technologies complement information technologies by providing the means to link and share experiences and knowledge. My belief is that the potential of the multi-functionality of ICT, if exploited in a pedagogically sound manner, can enable teachers to add a further dimension to their teaching and their pupils' learning. My view is that for ICT to be successfully utilised in primary education teachers must be both able and willing to engage with ICT. I believe attitude can have a significant influence on the willingness of teachers to engage with ICT and more fully understand its pedagogic potential. This research has provided the opportunity for me to reflect on the issue of teachers' attitudes towards ICT in teaching and learning and consequently to communicate this issue to a wider audience and to enrich the understanding of it.

Given my commitment to the topic and beliefs and values I hold about the potential use of ICT in primary education, it was important to monitor the data collection and analysis for potential bias. Impartiality when interpreting this data required me to monitor my own views and beliefs and to be aware of the way they might impinge on the research.

This I did in the following ways:

- by cross checking the relevance and significance of issues with three different methods of data collection
- by identifying errors and anomalies in discoveries at the data reduction stage, to ensure that the subsequent analysis was based on internally consistent data
- by identifying and working within an ethical framework

4.3.3 The ethical dimension

Punch (1998: 179) describes the ethics and politics of qualitative research metaphorically as a swamp with no map. He suggests that each individual has to trace his or her own path, although not alone, as there are experienced mentors, professional publications and guidelines on research practice. Politics and ethics of

research permeate every phase of the research process. Here I indicate how the empirical research conducted in this study meets ethical and professional standards. From the literature dealing with the theoretical dimension of ethics in research design, relevant aspects of ethics appertaining to this research have been identified and responded to. The specific procedures adopted are illustrated below in Figure 9 and explained in relation to the four main parameters indicated in the diagram - respect for the quality of educational research, respect for person, respect for knowledge and respect for justice and within the law.

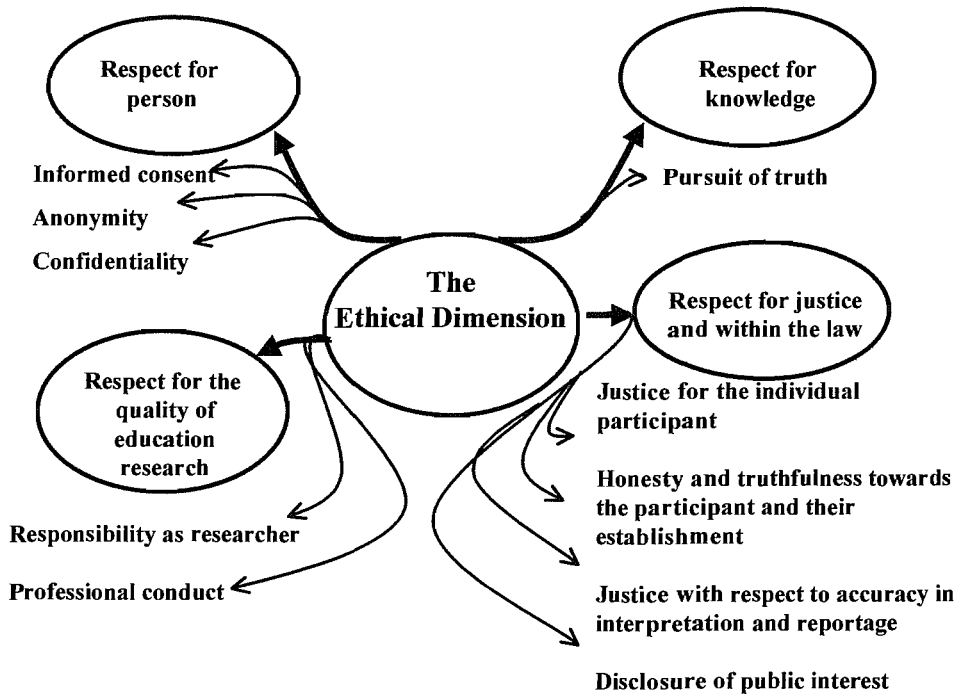

Figure 9 The ethical dimension

4.3.3.1 Respect for the quality of educational research

a) *responsibility as researcher*

The research presented here has been conducted within the guidelines of the School of Education, University of Southampton that are based:

> ...on the belief that all educational research should be conducted within an ethic of respect for persons, respect for knowledge, respect for the quality of educational research, a respect for justice and within the law (University of Southampton, 2004/5).

b) *professional conduct*

Both during the planning and the undertaking of the data collection procedures I kept in mind the fact that I would be working with professional colleagues and would be investigating issues that pertained to sensitive or complex subject matter, as the focus of this study is attitude, which by its nature is a sensitive issue. My professional conduct as a teacher and responsibility as a researcher dictated that the research be planned and undertaken in an open, democratic manner, with respect for and honesty towards all participants. As a teacher I am further guided by professional standards set out by the General Teaching Council for England. My commitment to my colleagues falls within the following statement:

> Teachers support their colleagues in achieving the highest professional standards. They are fully committed to sharing their own expertise and insights in the interests of the people they teach and are always open to learning from the effective practice of their colleagues. Teachers respect the rights of other people to equal opportunities and to dignity at work. They respect confidentiality where appropriate (GTC, 2004: 2)

4.3.3.2 Respect for person

a) *informed consent*

Each potential participant was provided with:

- information about their rights and my responsibilities as a researcher and the level of involvement required from them
- a consent form which set out clearly what they would be agreeing to should they decide to take part in the research process.

These two documents are in Appendix 4.

b) *anonymity and confidentiality*

Each interview was opened with a declaration that anonymity would be guaranteed to each interviewee, their school and its location by the removal of any identifying factors. It was also made clear that the issue of confidentiality would be preserved to the extent that data provided by each interviewee would be transcribed by me and no connection would be made publicly between the information they provided and their identity (Cohen et al., 2000).

4.3.3.3 Respect for knowledge

a) *pursuit of truth*

The pursuit of truth in the reporting process was supported through triangulation. The awareness of bias was addressed by formulating the research instruments within a structured framework.

4.3.3.4 Respect for justice and within the law

a) *justice for the individual participant*

Each participant was advised of their right to request that any part or all of their contributed material be withdrawn from use in the study - in no case did this occur.

b) *honesty and truthfulness towards the participant and their establishment*

In undertaking the fieldwork for this study as a teacher I was aware I needed to approach the selected schools through the correct channels. The first step in this process was to approach the official gatekeeper, the headteacher, to explain the intended study and assure her/him that the research would be conducted in an ethical manner expected of and required by a researcher and teacher. I guaranteed that anonymity to their school and teachers would be preserved throughout the study.

c) *justice with respect to accuracy in interpretation and reportage*

Interviews were arranged to take place in each teacher's own school in a location that provided privacy. At the end of each interview each respondent was given the opportunity to add any further comments that they felt relevant. On completion of the interview each participant was asked if they wanted to receive a transcription. Prior to each observation each participant was informed about the focus of the observation and shown the observation pro forma. On completion of the observation each participant was given the opportunity to review the notes made and receive a copy.

d) *disclosure of public interest*

A written declaration was provided to each participant (See Appendix 4) informing them of the purpose of the research namely that:

- the research being conducted was part of a study that would lead to a thesis in fulfilment of a doctorate

- the research is not being sponsored by any agency
- the study is to investigate the teachers' attitudes towards ICT
- if requested a summary report of research findings would be provided

4.4 Phase 2: Theoretical paradigms and perspectives

4.4.1 Research paradigms in education

In lay terms, a paradigm is a way of looking at the world. Mertens (1998: 7) suggests that there are three major paradigms in the research community, positivism/postpositivism, interpretive/constructivist and emancipatory and that many different labels have been used for each paradigm as shown in **Table 5.**

Positivism/Postpositivism	***Interpretive/Constructivist***	*Emancipatory*
Experimental	Naturalistic	Critical theory
Quasi-experimental	Phenomenological	Neo-Marxist
Correlational	Hermeneutic	Feminist
Casual comparative	Symbolic interaction	Race specific
Quantitative	Ethnographic	Freirean
	Qualitative	Participatory
		Transformative

In Mertens adapted from Lather (1992)

Table 5 Labels commonly associated with different paradigms

Interpretive/constructivist and qualitative have similar characteristics. The research reported here falls into the interpretive/constructivist paradigm, as it is naturalistic in setting in the sense that Bogdan and Biklen (1982: 27) define natural setting as the direct source of data and the researcher as the key instrument. The natural setting for this study is a sample group of primary school teachers working in their own professional environment and time. In this case the researcher is the sole co-ordinating instrument and the aim is to elicit teachers' constructs of the social world of computer use in the classroom by using qualitative methods. The primary research instrument, interview, was conducted in 'quasi-naturalistic' settings that is each interview was conducted within each teacher's own professional environment and time.

For a major part of the last century the dominant research paradigm in education was based on a "positivist" view of the world that dominated the natural sciences early in the last century and probably came to educational research through its links with psychology (Anderson with Arsenault, 1998: 4). This paradigm integrated both a view of the nature of knowledge and a view of appropriate methods of research. Opponents of positivism within the social sciences reject the view of the belief that general, universal laws govern human behaviour and are characterised by underlying regularities. They are also in agreement that the social world can only be understood from the view of individuals who are part of that world (Cohen et al., 2000: 19). This interpretive view of knowledge holds that in complex fields such as education, the world cannot be completely determined and that the particular setting or context in which individuals or groups are functioning is the way in which we come to know the situation. Teachers are part of the social world and therefore have to work within it, utilising all that comes with it, including information and communication technologies.

4.5 Phase 3: Research strategies

This study was designed in two phases - a pilot study and a main study of 22 teachers and their attitudes to ICT in teaching and learning. The pilot study was conducted with a sample group of 7. The main study, primarily qualitative and multi-method was conducted using interview, observation and questionnaire as research instruments to complete between-method triangulation.

4.5.1 The pilot study

The pilot study was undertaken as a single round, single method of data collection. The data obtained from this were then manually coded and analysed. In the pilot, teachers were asked to provide their views within the following areas:

- ICT and its value in teaching and learning
- feelings/emotions about computers in general
- time concerning use and training
- use of ICT in preparation for teaching
- ICT and professional development

- benefit/non-benefit of ICT in life in general

The pilot study was important in two respects. First it showed the practicability of obtaining valuable data about attitude through the use of open-ended statements. Secondly, and more importantly, it indicated the potential for more in-depth research to investigate the connections teachers' attitudes have with ICT and teaching and learning. However the pilot further revealed that to obtain more fine-grained data, other methods of data collecting would need to be used in the main study.

4.5.2 Development of research framework

The analysis of the pilot study data revealed a number of elements regarding teachers' views about ICT, shown in column 1 in Table 6. Considering each element in turn it became apparent that it would be possible to group them into attributes that either affect attitude or were indicators of attitude, in other words how teachers think and how they behave as ICT users. Five descriptive terms (shown in column 2 in Table 6) covering each area were derived from the synthesis of the elements. For example where a respondent expressed a view regarding professional development and ICT; this was allocated into ***skills, knowledge*** and ***understanding*** as professional development enhances each of these attributes of a teacher. These five descriptive terms formed the research framework elements for the main study. Developing a tight and identified framework provided clear limitations and focus.

1	2
Identified elements from pilot study	**Descriptions forming the research framework**
• potential and futures of ICT • the motivation of ICT • teachers and training to use ICT • timeliness of training • teacher -personal initiative • potential of ICT training • teachers' relationship, resistance, condition to ICT	teachers' ***values*** and ***priorities*** regarding ICT
• personal use/benefits • implication of personal adoption • teacher-conditional • reliability	teachers' ***confidence*** and ***knowledge*** to use ICT as educators
• professional development • learners and ICT • teaching and ICT • location, quantity, differing equipment	teachers' ***skills, knowledge*** and ***understanding*** of ICT to inform their pedagogy
• type of use • teachers' needs • children skills/training • concerns about children's usage	teachers ***use*** of ICT as part of the teaching and learning process
• administration • personal use/benefits • personal impact	teachers ***use*** of ICT as part of the management process of teaching and learning

Table 6 Transition of elements from pilot to main study framework

4.5.3 Sampling strategy

Preston (2001: 22) suggests that too many studies about ICT use in classrooms are conducted with teachers who are not confident. Focusing research on confident teachers however provides a mismatched picture of ICT use in teaching, as it would not necessarily be representative. Research into both groups is relevant as the former is likely to identify shortcomings and the latter, good or best practice. No judgements have been made about the ICT competence or abilities of the teachers in this study. They have been selected solely on the criteria described below.

This study, based in five separate schools, is not aimed at making sense of ICT teaching and learning practices within each school. It is however a multi-method qualitative study about teachers' attitudes to ICT in teaching and learning. Stake (1994), when discussing sampling strategies for case study suggests that, 'Balance and variety are important; opportunity to learn is of primary importance (ibid.: 102). Although Stake is referring to case study his suggestion is equally applicable to other qualitative studies. In considering the process of selection for this study I was guided by Stake in that I identified a typology of geographic location, catchment area, size and type of school within which most teachers are likely to work with the 5 to 11 age range within the County of Hampshire in England. Table 7 shows the details of the schools that comprise this study.

	School A	School B	School C	School D	School E
Geographic Location	Rural*	Outskirts of city*	Rural*	Outside city*	City centre school*
Catchment Area	Serves a local village community*	Serves local social housing estate*	Favourable social and economic circumstances*	Generally advantaged*	Mixed community*
School Size	85 - small	159 - medium	104 - small	245 - average	359 - large
School Type	Primary 5-11	Primary 5-11	Primary 5-11	Junior 7-11	Community 7-11

*as defined by OFSTED school reports

Table 7 Matrix of selection criteria for schools

The selection criteria for the participants were:

- each teacher in the sample group had to be a primary (5 to 11 age range) class teacher,
- each teacher in the sample group had to be in-service and have either

  (a) qualified prior to 1999 and have received NOF training

  or

(b) qualified after 1999, when all NQTs would have to be ICT literate to a mandatory standard to achieve Qualified Teacher Status

In theory all teachers should have knowledge of the National Curriculum directives and expectations regarding ICT in teaching and learning. All teachers who met criteria (a) and (b) above should know and have met the Expected Outcomes for serving teachers which is based on the Initial Teacher Training National Curriculum for the use of ICT in subject teaching. Using these selection criteria ensured that all the participants in the sample group should have the same starting base of ICT training.

4.6 Phase 4: Methods of collection and analysis

The chosen research instruments namely, interview, observation and questionnaire were created within the boundaries of the research framework, which was informed by the pilot study. Using these three methods of data collecting supported the process of triangulation.

4.6.1 Triangulation

The reasons for triangulation emanate from a wish, on the part of social researchers, to both get under the surface of social phenomena and to broaden the approach to research and analysis. Denzin (1970) is one of the principal exponents of triangulation and views triangulation as a method of addressing some of the issues regarding bias from whatever sources that may be evident in single method research:

> Triangulation, or the use of multiple methods, is a plan of action that will raise sociologists above the personalistic biases that stem from single methodologies. By combining methods and investigators in the same study, observers can partially overcome the deficiencies that flow from one investigator and/or one method (ibid.: 300).

Denzin offers a generic definition of triangulation as being that of using multiple methods in the study of the same object. According to him, methodological triangulation can take many forms but fundamentally it is the combination of two or more differing strategies of study on the same empirical unit. He describes two forms of this type of triangulation. The first being within-method triangulation

involving the investigator using multiple strategies within one method, to study a single subject, the second is between-method triangulation, where the investigator uses different methods to study the same subject.

4.6.1.1 Reasons for using triangulation

To extract the maximum amount of correlated information from the research data, it was necessary to ensure that procedures used for data collecting supported and supplemented each other. To this end between-method triangulation was adopted, using interview, observation and questionnaire as methods of data collection with documentary evidence relating to teachers' planning as a secondary source. Not all methods of data collection are applicable to all research issues. A 'range of interconnected methods, hoping always to get a better fix on the subject matter at hand' (Denzin & Lincoln, 1998b: 3) was used.

Denzin (1970) suggests that the researcher uses triangulation to bring validity and rigour to data collection and analysis. There are two forms of validity: internal and external. Internal validity refers to the truthfulness, accuracy or authenticity of data collected, giving the researcher confidence in the results obtained. Using triangulation of data collection methods in this study strengthened its internal validity by, '...striving to minimize invalidity and maximize validity (Cohen et al., 2000: 105).

Triangulation was used for three distinct purposes. First to bring internal validity to the data collection, second to identify errors and anomalies in discoveries at the data reduction stage to ensure that the subsequent analysis was based on internally consistent data and third to overcome potential biases. As a teacher involved with the implementation of ICT in primary teaching over a number of years I am aware that researching in my own 'backyard' can bring biases traced to prior knowledge and experience and pre-conceived values and beliefs. However this is an issue faced by social researchers.

4.6.1.2 Validity through triangulation

Interview was the principal instrument of the data collecting process and provided the majority of the data gathered. To maximise its validity there were a number of considerations that had to be taken into account. Cohen et al. (2000) suggest that the most practical way of achieving greater validity is to minimise bias that can come from the interviewer, interviewee and the content of the questions. They provide a number of illustrations of actions that contribute to bias:

- the attitudes, opinions, and expectations of the interviewer;
- a tendency for the interviewer to see the respondent in her own image;
- a tendency for the interviewer to seek answers that support her preconceived notions;
- misperceptions on the part of the interviewer of what the respondent is saying;
- misunderstandings on the part of the respondent of what is being asked (ibid.: 121)

To control the consistency of the interview and the subsequent reliability of the results, the interview guide was specific in order to ensure that all interviewees were asked the same questions in the same format and sequence (Silverman, 2001: 89). Focusing and controlling the content of the interview simplified the processes of data reduction and analysis. A one-to-one interview technique was adopted and a structured interview schedule was used to focus the subject matter and to obtain rich, relevant data. Misleading information or not telling all, due to insecurity in the presence of the interviewer may invalidate the data. Using additional methods of data collection, i.e. observation and questionnaire together with interview supported and cross-referenced the data, helped to overcome this.

Picking up on the above actions I was aware that bias could come from me in that I may be seeking verification of pre-conceived views that I may hold. As previously mentioned, I have a long-term interest in the subject of this study and bearing this in mind I had to be aware of the need to approach the interview matter with impartiality. With regard to this, I was sound in the preparation of the interview questions and strived to avoid bias by formulating questions that focused on the research framework.

In the Introduction chapter I discussed how the five multi-conceptual elements of attitude and their characteristics were arrived at. These guided the development of the qualitative research instruments, namely interview, observation and questionnaire. Each method is described in detail below, together with the rationale for choosing it and the way it was used.

4.6.2 Interview

Denzin and Lincoln (1998a: 36) suggest that interview is the favourite methodological tool of the qualitative researcher. The advantage of the interview in social research is that it allows the researcher to get beneath the surface to gather information and inside knowledge of a person's experience, opinions, aspirations, attitudes, beliefs and feelings. An interview provides a situation where people can be more easily engaged and the interviewer can clarify questions and probe the answers. Interviews vary in style and format, from the structured interview based on a questionnaire, to the unstructured where a list of topics is covered, to the in-depth interview, which can last for hours and topics are talked around. The most common type of interviewing is face-to-face verbal interchange. Bogdan and Biklen (1982: 136) suggest that qualitative interviews vary in the degree to which they are structured and that even when an interview guide is employed there is still considerable latitude for the interviewer to pursue a range of topics.

The purpose of an in-depth interview is to understand the experience of those being interviewed (Seidman, 1998: 3) and to gather descriptive data in the subject's own words so that the researcher can develop insights on how subjects interpret some piece of the world (Bogdan and Biklen, 1982: 135). Cohen and Manion, (1994: 272) further suggest that interview can also be used to test a hypothesis and to supplement another method of data collection, as in this study. Anderson with Arsenault (1998: 191) categorise, according to purpose, interviews as being one of two types, normative and key informant. They see data from normative interviewing as being for statistical analysis, whereas key informant interviewing is directed at respondents who have particular experience or knowledge about the subject being discussed. By filtering the sample group, all the interviewees in this

study were serving teachers who had achieved a mandatory standard in ICT or had participated in NOF training. Consequently each interviewee would have undergone minimum levels of training with the use of ICT in teaching and learning. Anderson with Arsenault (1998) stress the importance of the key informant interviewer being an expert in the subject under discussion in order to:

> ...grasp new information and use it to pursue new directions. The interviewer is interested in building understanding and in this sense the key informant interview is a teaching situation in which the respondent teaches the interviewer about events and personal perspectives (ibid.: 191).

As the focus of this study is to obtain an insight into teachers' attitudes to ICT in teaching and learning, key informant interviewing provided a situation where it was possible to probe, in depth, the views of the sample group of teachers.

Using interview for data collection in this study provided an opportunity for the sample group of teachers to relate their experiences of and their attitudes to ICT in teaching and learning. Interview was the principle means of collecting data and was supplemented with observation and questionnaire to provide:

> '...access to what is "inside a person's head", [it] makes it possible to measure what a person knows (knowledge or information), what a person likes or dislikes (values and preferences), and what a person thinks (attitudes and beliefs) (Tuckman,1972: 268).

4.6.2.1 Development of the interview schedule

Interview was designed to be the principal instrument of obtaining data with observation and questionnaire being used to complete triangulation. It was considered that, by devising questions within the research framework, they would illuminate each particular concept of attitude more effectively than just wide ranging questions for example, 'What bearing does ICT have on you as a teacher?' The interview schedule was based on the identification of issues arising from the pilot study. Table 8 shows the transition from elements from the pilot study to the generic issues, which then provided the ideas for the development of the interview schedule. The sequence as presented in the table has no ordinal significance.

Identified elements from pilot study	Generic issues	Ideas for interview schedule development
• teacher -personal initiative • teachers' relationship, resistance, condition to ICT • learners and ICT • teaching and ICT • type of use • children's skills/training • concerns about children's usage	***using ICT - adoption process***	perception of ICT and teaching and learning pedagogical understanding of use of ICT in teaching integration of ICT into subject teaching selecting appropriate ICT for tasks value of ICT to the process of educating acquiring relevant skills – how and when? time availability
• teachers and training to use ICT • timeliness of training • potential of ICT training • professional development	***training***	training training received value of training/professional development time spent on training professional development plan for ICT type of training what type of training is valued?
• the motivation of ICT • teachers' relationship, resistance, condition to ICT • personal use/benefits • implication of personal adoption • teacher-conditional • reliability • location, quantity, differing equipment	***personal approach to ICT***	demands made by the importance placed on ICT adaptability of teachers to change – need to develop professionally - how is this being done? personal competence points that have helped with taking ICT on board points that have hindered taking on board ICT level of personal ICT usage enjoyment (or not) of having to use ICT in teaching
• potential and futures of ICT • teachers' needs • administration • personal use/benefits • personal impact	***adoption process administration***	personal use/benefits using ICT for planning, report writing etc. using ICT for researching ideas, lesson plans etc using ICT to keep up to date with educational issues

Table 8 Development of the interview schedule

4.6.2.2 Validation of the interview schedule

The initial concept of the interview schedule was that the research framework, multi-concepts of attitude and questions would be closely related and thus would assist in the coding process and was drafted as such. This initial interview schedule is shown in Appendix 5. This first interview schedule was trialled amongst a group of primary teachers; significantly the outcome indicated that the questions were satisfactorily fulfilling the aim of obtaining quality data regarding teachers' attitudes. The trial interviews also had a bearing on the coding process and this is explained and developed in Section 4.6.8.2. Additional benefits that resulted from the trial interview process were that I was that able to satisfactorily develop the process of audio recording and transcriptions of the trial interviews to support the main study. The finalised interview schedule is shown in Appendix 6.

4.6.3 Observation

Adler & Adler (1998: 81) refer to observation framed in the qualitative paradigm as being fundamentally naturalistic in essence. They further explain that observation draws the observer into a world where connections, correlations, and causes can be witnessed as and how they unfold. According to Anderson with Arsenault (1998: 128) there are three ways a researcher observes within the research setting; the complete observer (non-participant), the complete participant, and the participant observer. The rationale for the use of observation in this study was to use a method of data collection that would allow me to observe teachers' behaviours in their own naturalistic setting. It further provided me with the opportunity to observe teachers' awareness of and behaviour to ICT in their teaching and the influence that ICT has on them as teachers.

4.6.3.1 Development of the observation process

When deciding which observer role to play the aims of the observation had to be clear. These were to observe the teachers' interactions with their pupils and reactions to their pupils. My initial thought was to take the role of complete participant observer as I considered that this situation would be more comfortable for the teacher being observed. After much thought I rejected this role and decided

that the most effective means to achieve my aims was to take the role of the complete, non-participant observer as this situation provided the means to observe without distraction.

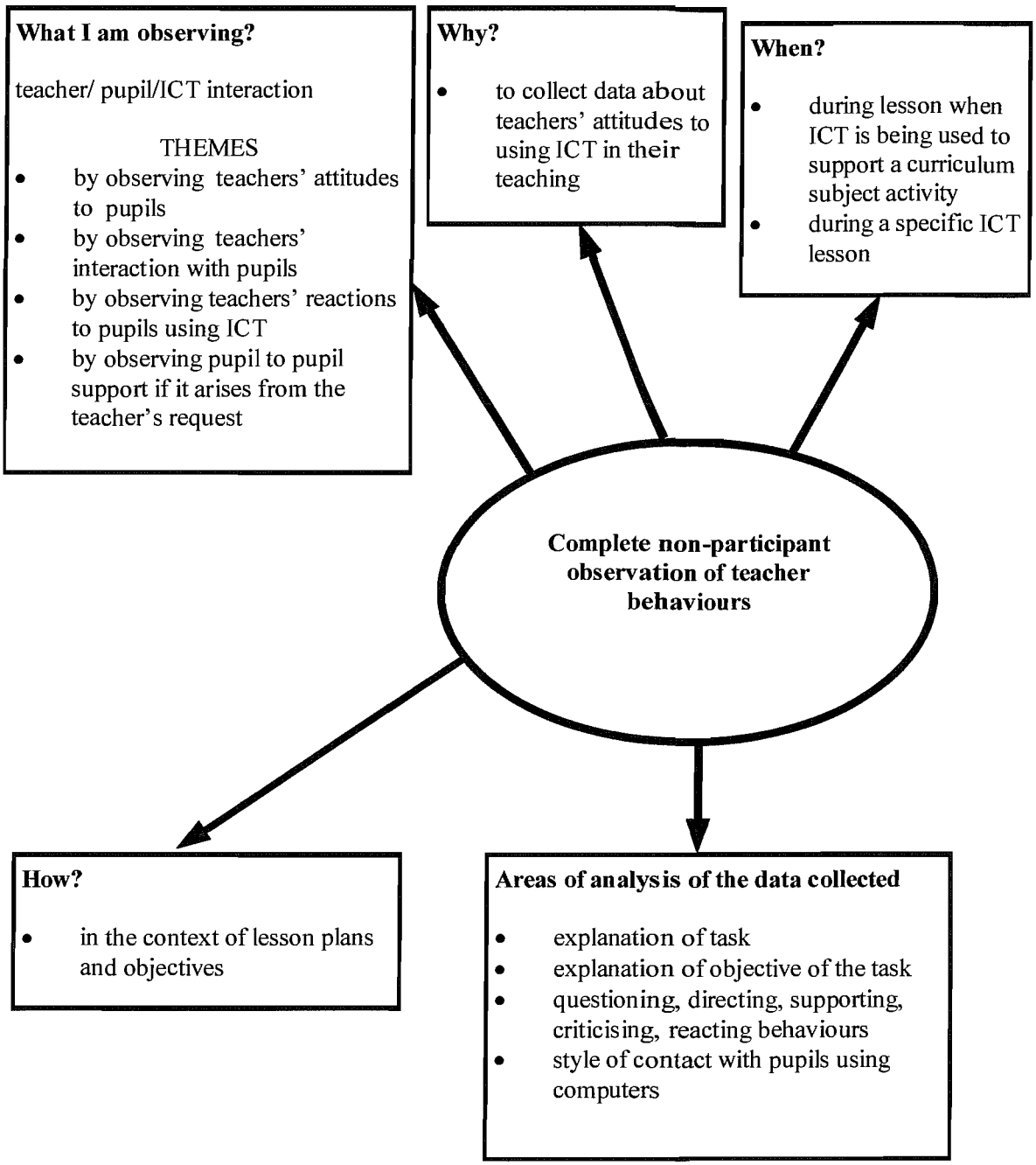

Figure 10 Observation framework

Figure 10 illustrates the components of non-participant observation used in this study. A number of specific predetermined themes to be observed were identified. The Kennewell model, discussed in Chapter 2, provided a structure within which

the classroom activities were observed, with Figure 11 below showing the model as adapted for this study.

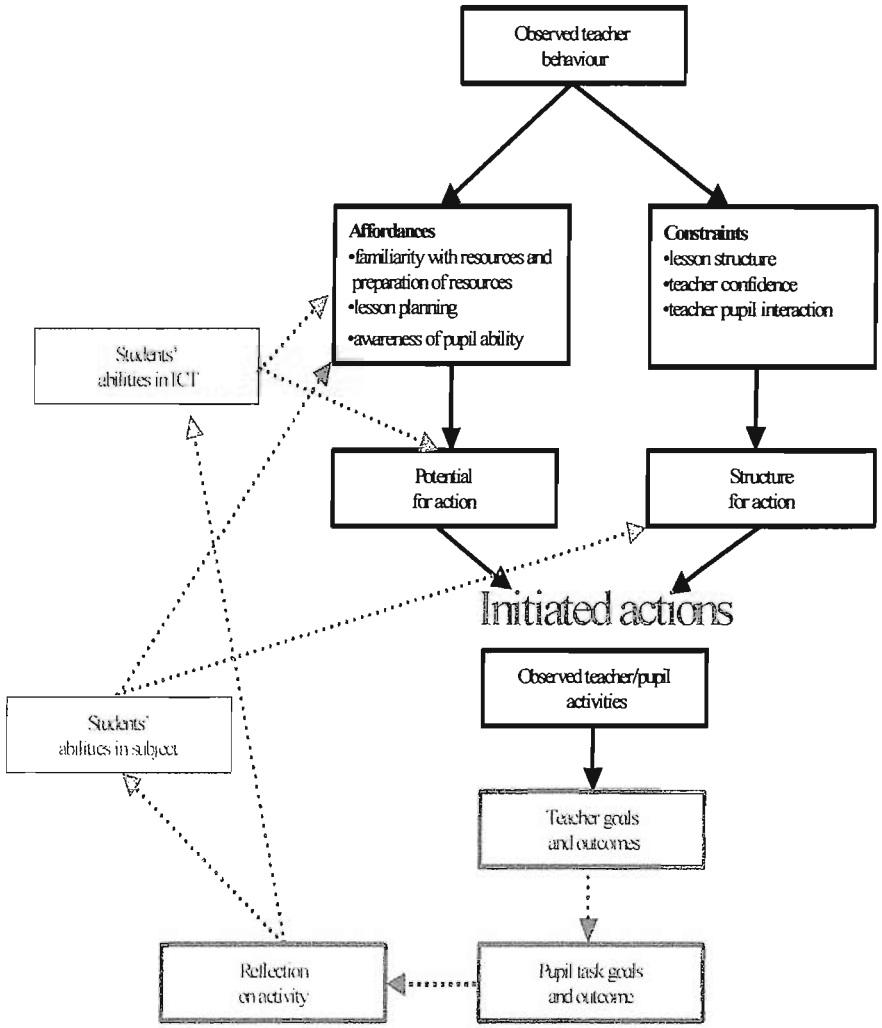

Figure 11 Influences on classroom activity (adapted from Kennewell, 2001: 108)

The teacher's role in Kennewell's model is to orchestrate the learning situation through using affordances and constraints. Within this construct the elements identified as affordances and constraints and used within the lesson, were observed. Those elements of the model that do not directly relate to the teachers' behaviours observed in this study have been greyed out (Figure 11). Within this study the interest is in that of teachers' behaviours and not the pupils' abilities, however the

teacher does need to be aware of these. The actual observation model used in this study is shown in Figure 12

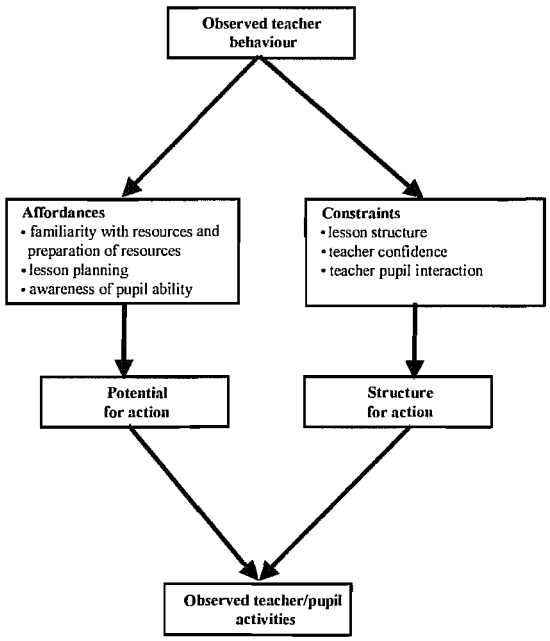

Figure 12 Classroom observation model (adapted from Kennewell, 2001: 108)

Teacher ID: **Date:**

Key Elements of Observation for Analysis

1. Description of Location:

2. Type of lesson:

3. Type of equipment used:

4. Why was it selected (refer to planning):

5. Why is ICT being used (refer to planning):

6. Teacher's perception of the technology

Preparation	Familiarity	Confidence

7. Teacher's interaction with pupils

When interaction occurs Proactive (P) Reactive (R)	Who initiates interaction Teacher (T) Pupil (P)	Consequence of interaction Structured (S) Helpful (H) Effective (E) Ad Hoc (A)	Follow up activity	Pupil to pupil support if arises from teacher request

Figure 13 Observation pro-forma

During the observation process notes were made on a prepared pro forma, illustrated in Figure 13 with a completed example included in Appendix 7. Sections 1 - 3 were used to gather information regarding the lesson location and type together with the ICT equipment used within the particular lesson. Sections 4 and 5 were used to record the purpose and planned outcomes of using ICT in the lesson obtained from the teacher's planning sheets. Section 6 was used to collect observed data concerning the preparation of the ICT equipment for the lesson and the teacher's familiarity and confidence with it. Each of these was considered within the parameters of the lesson. The data on lesson planning from Sections 4 and 5 and the observed data from Section 6, when analysed together, provide an overall view of each teacher's perception of the use of technology in the lesson. Section 7 was designed to allow recording of teacher/ pupil/ ICT interaction during the lesson. Occurrences of teacher/pupil interaction, their initiators, consequences and follow up activities were also recorded. The tones of the interactions were classified as being structured (as taken to be part of the planned progression of the lesson), helpful (in the immediate situation) effective (did it solve the issue being raised) and ad hoc (unplanned interaction by the teacher). Section 7 of the observation process was primarily designed to provide data concerning teachers' awareness (perception) and their behaviour as ICT users (psychology). This section was developed on the basis of my knowledge as an ICT co-ordinator and my experience as a class teacher. Figure 14 represents the stages of the interaction focussing on the teacher's behaviours, here defined as being

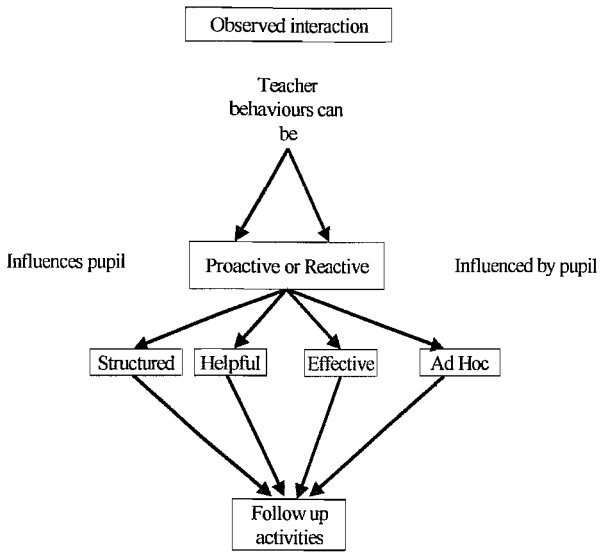

Figure 14 Observed stages of teacher/pupil interaction when ICT is being used in a lesson

proactive (teacher initiated) or reactive (pupil initiated). To maintain an open approach to the data collecting process, prior to each observation, the teacher involved was shown the observation pro forma and had the observation procedures explained to them. Each teacher was offered the opportunity to discuss the notes made during the observation and to receive a copy.

4.6.3.2 Validation of the observation process

An element of my professional activities as an ICT co-ordinator was to carry out regular classroom observations of colleagues' use of ICT in teaching and learning as part of a monitoring process. A part of these observations was to observe elements of teacher/pupil/ICT interactions during lessons. I have carried out previous observations using a similar assessment pro-forma to that designed for Section 7 of the observation process used in this research.

4.6.4 Questionnaire

Cohen et al. (2000) suggest that a semi-structured questionnaire can be a powerful tool that '...sets the agenda but does not presuppose the nature of the response' (ibid.: 248). They define it as being a series of questions, statements or items that the respondent is asked to answer, respond to or comment on. They further stress that the purpose of a questionnaire must first be clarified and then translated into an aim or set of aims (ibid.: 246).

4.6.4.1 Development of the questionnaire

The questionnaire for the main study developed directly from the pilot study data collecting instrument (see Section 4.5.1), this is shown in Table 9. The purpose of the questionnaire (See Appendix 8) was for it to be part of the triangulation process and to provide members of the sample group the means to respond in their own space and time. Providing the respondents with the opportunity to record their views without the researcher being present can add to the richness of the data collected.

The aims of the questionnaire comprised three parts:

Part A to:

- establish a profile of the sample group to provide a method to filter out those teachers that did not meet the selection criteria defined in the sampling strategy in. 4.5.3

Part B to:

- provide a background to professional use of ICT

Part C to:

- gather teachers' own views about the implementation of ICT in primary education. The questions were open and of a qualitative nature and were designed to elicit teachers' responses to:
    a) feelings about the introduction of ICT
    b) opinions about the use of ICT
    c) their own use ICT
    d) their views about expectations

The questionnaire was distributed to all the teachers at the initial presentations made in each of the schools participating in this study. It was anticipated that not all the teachers present would return the questionnaire or wish to take part in the research.

4.6.4.2 Validation of the questionnaire

Part A of the questionnaire was used purely as a filter and Part B was used to indicate ICT use. Part C of the questionnaire was validated by the results from the pilot study, which demonstrated it was possible to obtain qualitative data using this method.

Pilot study areas	Questions informed by pilot study
• General	**A. About you** Name: _____ **A1.** Are you: Male ☐ Female ☐ **A2.** Did you complete your teacher training prior to 1999? Yes ☐ No ☐ **A3.** Have you undertaken NOF training? Yes ☐ No ☐ **A4.** Which best describes your role in your school? (You may tick more than one) • School Management Team ☐ • ICT Co-ordinator ☐ • Subject Co-ordinator ☐ • Class teacher ☐
• Use of ICT in preparation for teaching • ICT and professional development	**B. About your professional use of ICT** **B1.** How do you use ICT to support your day-to-day teaching work? • Preparation of teaching materials ☐ • Record keeping ☐ • Report writing ☐ • Access to reports and responses to classroom focused research. ☐ • Access to reports and responses to inspection findings. ☐ • Access to professional discussions ☐ • Access to professional development materials ☐ • Others ☐ Please specify .....
• ICT and its value in teaching and learning	**C. Your views about the implementation of ICT in primary education** C1. How do you feel about the introduction of ICT into the primary school curriculum?
• ICT and its value in teaching and learning • Time concerning use and training • Use of ICT in preparation for teaching	C2. What is your opinion about the use of ICT in primary education?
• Use of ICT in preparation for teaching • Benefit/non-benefit of ICT in life in general	C3. How would you describe your use of ICT in your teaching?
• ICT and its value in teaching and learning • Feelings/emotions about computers in general	C4. 'Serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum.' What are your views about this statement?

Table 9 Relationship between pilot study and main study questionnaire

4.6.5 Relative value of research instruments as data sources

All methods in the data collecting process provided data, however some provided richer and more significant data for each of the multi-concepts of attitude than other methods, as illustrated in Table 10.

Multi-conceptual definition of attitude	Methods of data collection and level of providing data		
	1st Level	2nd Level	3rd Level
Philosophy	Interview	Observation	Questionnaire
Bearing	Interview	Observation	Questionnaire
Mindset	Interview	Questionnaire	Observation
Perception	Interview	Observation	Questionnaire
Psychology	Observation	Interview	Questionnaire

Table 10 Level of importance of each method of data collection

4.6.6 Making contact and implementing the data collecting process

Of the original five schools selected, according to the sampling criteria, two head teachers declined the request to conduct research in their schools. The reasons given were that one was not interested in research taking place in their institution and the other headteacher felt that they could not put their teachers in the situation where they would have to take on more work. Two replacement schools that fitted the original criteria were identified and selected. On receiving the head teacher's approval arrangements were made for a presentation to their teachers. At this the aims of this study and the procedures and processes involved in the data collection process were explained. Each potential participant was given a pack (Appendix 4). At the same time the questionnaire was also distributed and arrangements were made to collect this and the consent form after completion. The head teachers and staff of the five schools used in this study were most welcoming and helpful.

At each school the sequence of data collection was questionnaire, followed by interview and finally observation. In the selected schools, 36 questionnaires were distributed, 29 were returned completed of which 22 respondents were selected to

take part in the study. The remaining 7 were not suitable in line with the selection criteria for participants or declined to take part. Of the 22 respondents all completed the questionnaire and agreed to be interviewed however only 13 agreed to be observed. Appointments for the interviews at each school were made in consultation with the head teacher as arrangements needed to be made for teachers to be released from their teaching commitments. Each interview lasted for approximately 45 minutes and all the interviewees agreed to have the interviews audio taped, which I later transcribed, verbatim.

Appointments for the observations were made with the teachers themselves. The observations were conducted during timetabled lessons with the only prerequisite being that ICT be used in any one of three ways; teaching with ICT, (teacher to pupils), teaching through ICT (pupils using ICT) or teaching ICT (teaching pupils skills). The length of the observed lessons ranged from 20minutes to 45 minutes and all year groups in Key Stages 1 and 2 were observed. The decision regarding the type of use of ICT that I observed was left to each individual teacher. In all cases the class teacher was advised of and agreed to the fact that I would be a non-participant observer. In the cases where planning sheets were not available prior to the lesson, the lesson objectives were verbally obtained from the class teacher prior to the lesson.

4.6.7 Data management

The quantity and type of data obtained required management and handling at a number of levels. Figure 15 shows how the questionnaire data were managed during this study. An Excel database of data from Parts A and B was created to establish a profile of the sample group. The data from Part C was allocated its own set within QSR-NVivo for subsequent coding and analysis.

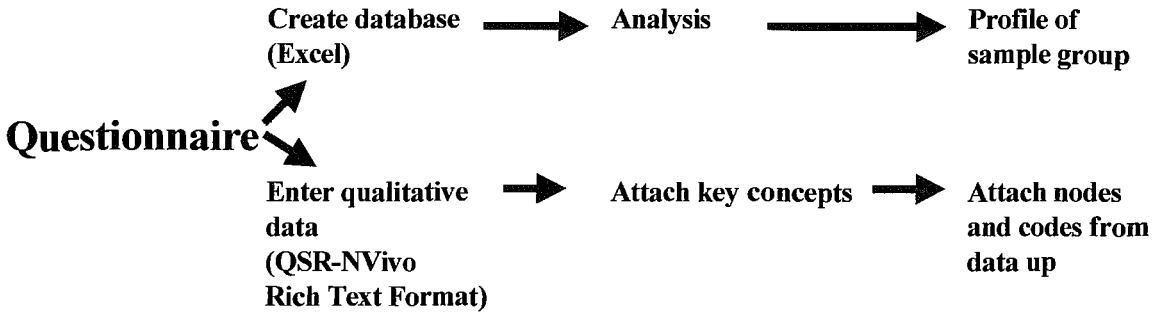

Figure 15 Management of questionnaire data

After individual interviews had been conducted they were transcribed verbatim. The interviews were allocated their own data set in QSR-NVivo for subsequent coding and analysis. Figure 16 shows how the interview data was handled.

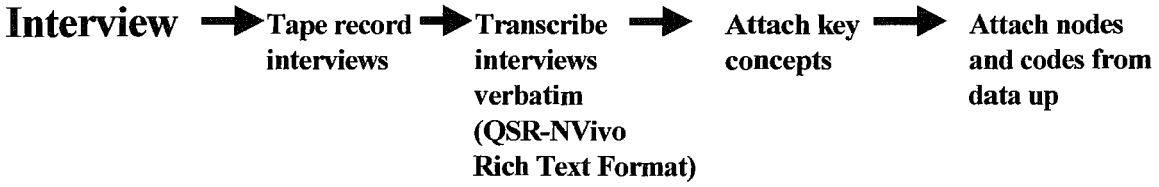

Figure 16 Management of interview data

The data from the observations were allocated their own data set in QSR-NVivo and then coded as shown in Figure 17.

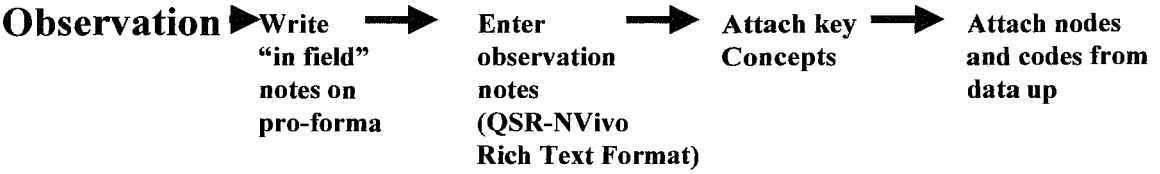

Figure 17 Management of observation data

4.6.8 Analytical activities

Collecting and coding the data accurately and consistently are some of a number of steps towards analysis. Miles and Huberman (1994: 11) suggest that analysis comprises three types of analytical activity - data reduction, data display and conclusions (drawing and verifying) - together with that of data collection they collectively form an interactive, cyclical process as illustrated in Figure 18

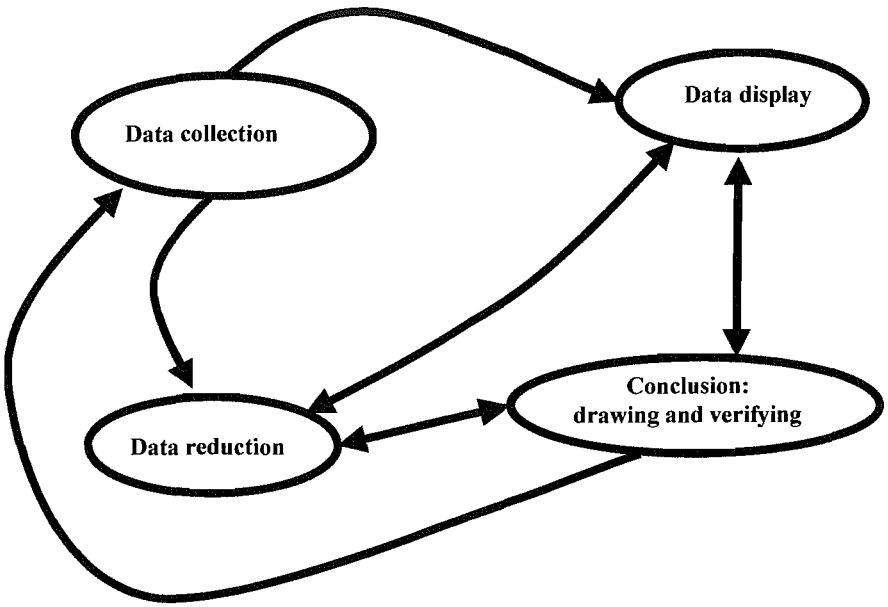

Figure 18 Components of data analysis: interactive model (Miles and Huberman, 1994: 12)

Miles and Huberman (1994) further state that, 'the researcher steadily moves among these four "nodes" during data collection and then shuttles among reduction, display, and conclusion drawing/verification for the remainder of the study.' (ibid.: 12) Analytical activities are described by Moustakas as taking place across five basic phases, which he identifies as:

> ... the initial engagement, immersion into the topic and question, incubation, illumination, explication and culmination of the research in a creative synthesis, (Moustakas, 1994: 18).

Miles and Huberman's 'nodes' and Moustakas' phases were applied to the stages of data collection and analysis within this study, shown in Table 11.

Miles and Huberman (1994)	Steps of Data Analysis for this Study	Moustakas (1994)
DATA REDUCTION DATA DISPLAY CONCLUSION DRAWING AND VERIFYING	Planning the data collection process	*Immersion* - with the experience
	Verbatim transcription - initial thoughts/concepts in note form	*Incubation* - a period of contemplation
	Using QSR-NVivo attaching nodes (words/phrases) that identify ideas, concepts (coding)	*Illumination* - a time of increased awareness, and expanded meaning giving new clarity
	Codifying (further refine coding)	*Explication* - new connections are made and preparations to communicate the findings
	Report writing (identifying/ linking, major themes/ patterns/trends/concepts/ agreements and disagreements and reaching conclusions. Identifying areas for further research	*Creative synthesis* - the research findings and experience are combined together, and communicated in writing

Table 11 Matrix of inter-related steps for data analysis

4.6.8.1QSR-NVivo and the coding process

QSR-NVivo is data handling software designed for use with data that is not easily reduced to numbers. The data collected produced 22 questionnaires, 22 interviews and 13 observations, which were encoded and processed electronically using QSR-NVivo software. The data acquired from each research instrument resulted in its own data set and were coded independently (Figure 19). Grouping the data in this way enabled triangulation searches to be made through each set of related data for analysis and interpretation.

Figure 19 Data sets

4.6.8.2 The influence of the trialling interviews on coding

The coding of the preliminary trialling interviews influenced how codes were determined for the main study data. Each interview question was developed with the intention of obtaining data relevant to a particular multi-concept of attitude. In the preliminary trialling interviews the questions were grouped into sections mapping directly to a concept of attitude as illustrated in Appendix 5. The assumption made in planning the interview schedule was that the multi-concepts of attitude and questions would seamlessly map together proved to be not totally accurate. The interviews revealed that the participants were providing answers, to individual questions, that ranged across more than one multi-conceptual element of attitude; this is shown in Appendix 9.

4.6.8.3 Determining the coding

The coding process underpins subsequent analysis and therefore must be planned, structured and consistent. Box 1 inset in Figure 20 shows the linear progression of the stages of the coding process. The coding process in this study very closely followed Moustakas' steps of ***incubation, illumination*** and ***explication***. Figure 20 illustrates the principal activities of the coding process mapped against the phases described by Moustakas. These activities do not have a one-to-one relationship with the phases; rather they sit within but sometimes overlap them. The process of ***incubation*** began with the transcription of the interviews, which proved to be a time consuming nevertheless extremely valuable exercise, as it enabled me to re-acquaint myself with the interview contents and to develop initial thoughts and concepts for the coding process. Appendix 10 illustrates a section from a coded interview showing attached nodes.

Miles and Huberman (1994: 61) describe a combination of 'a priori' and 'inductive' approaches where the creation of a general scheme of codes, that is not content specific, provides a framework within in which other codes can be developed inductively. In this study the level one and level two codes provided the

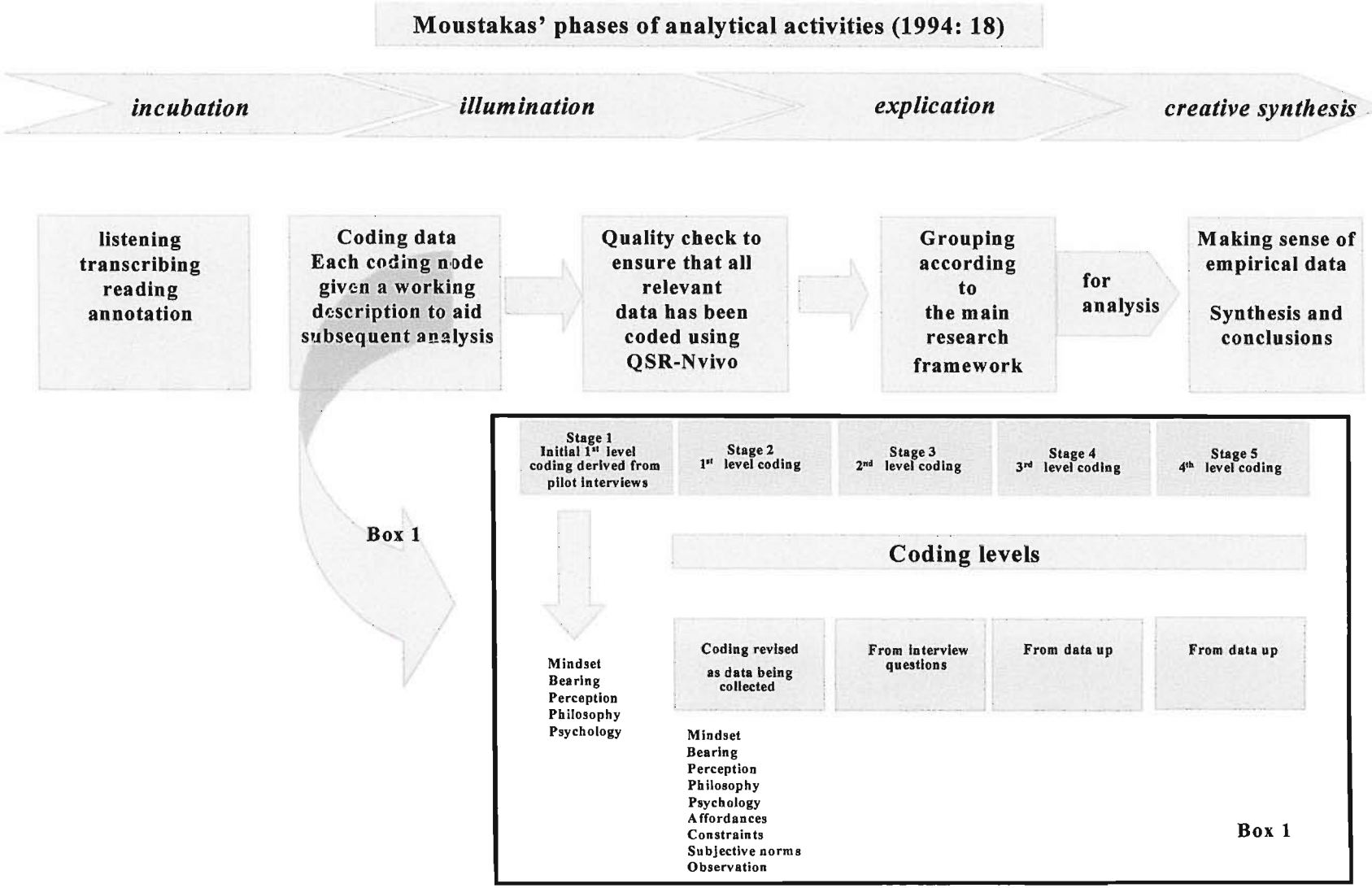

Figure 20 Analytical activities matched to Moustakas' phases

framework and levels three and four were derived inductively from the data. As the collected data for the main study was being processed in Moustakas' ***illumination*** phase, the first level coding was revisited and revised. In addition to the five multi-concepts of attitude, affordances, constraints and subjective norm were included as coding categories as the data indicated that these three concepts were sufficiently significant to be identified at the first level of coding. This revised coding is shown in Appendix 11. The interview questions provided a number of descriptions for the second level of coding, others were allocated from observation and questionnaire data. Those of levels three and four were derived from the data up. As these were derived from the data up it was essential that meaningful and consistent definitions for each were maintained throughout the coding process. Node descriptions for levels three and four were allocated, an example being illustrated in Figure 21.

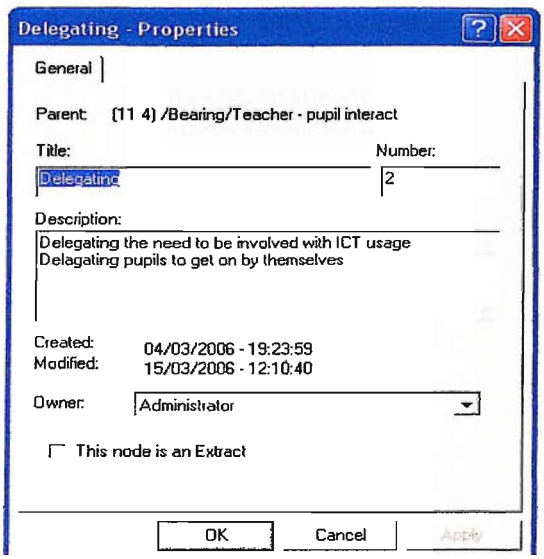

Figure 21 Level 3 coding

Miles and Huberman (1994: 61) suggest that many researchers use a simple two-level scheme where 'etic' provides a general framework and 'emic' a more specific level more meaningful to participants, but nested within the 'etic' codes. In summary, the codes for levels one and two may be determined as 'etic' and those of levels three and four as 'emic'.

The classroom observations were undertaken to supplement and verify the interview and questionnaire data obtained regarding teachers' behaviours in teaching situations. Observation was allocated first level coding as it gave rise to a considerable set of specific indicators of attitude in its own right. The questionnaires were coded within the same coding structure used for the interviews.

Coding took place as a result of a number of passes through the data, each pass refining its predecessor enabling the analysis and interpretation of the coded data to

reveal the indicators of attitude. The node models (Appendix 12) illustrate the component parts of the five multi-conceptual elements of attitude plus observation, affordance and constraints together with subjective norms. These models reflect the data as collected and organised prior to the process of regrouping for subsequent analysis. The finalised node list report is shown in Appendix 13. After completion of the coding process a quality check was conducted to ensure that all data had at least relevant first and second level nodes attached. Appendix 14 shows the quality checked node list report thus completing the ***illumination*** phase.

4.6.8.4 Synthesis of findings

The synthesis of findings fits within Moustakas' phase of ***explication*** and was completed by the grouping of the data, shown in Appendix 15, according to the main research framework.

Regrouping the data back into the research framework elements allowed the analysis to focus on attitude through teachers' values and priorities; confidence and knowledge; skills, knowledge and understanding; use of ICT as part of the teaching and learning process and use of ICT as part of the management process of teaching and learning.

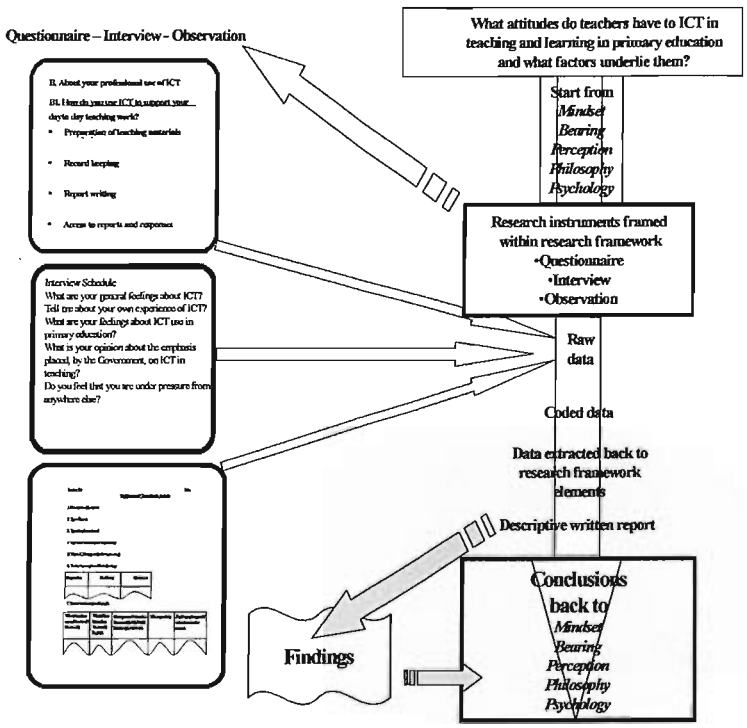

Figure 22 The research processes

The synthesis of findings emerged from a series of processes illustrated in Figure 22. These processes are the component parts of the research, from the principal research question and its multi-concepts to the conclusion that addresses them. The

specific processes that are concerned with the synthesis of findings are highlighted in the shaded oval. These processes began with the coded data, which were copied and regrouped under the most appropriate research framework heading. The broad criteria for the regrouping were guided by the elements from the pilot study as shown in Table 12 together with judgements made in the light of:

- interpretation of the data provided
- the tone of the tenor of the response
- expertise and background gathered from the pilot study
- my expertise as an ICT co-ordinator
- my expertise as a teacher

Research framework element	Broad criteria
Background	• general feelings • experience • general views
Teachers' values and priorities regarding ICT	• training • professional development • what teachers think about ICT • feelings about ICT • expectations – personal • expectations – external professional
Teachers' confidence and knowledge to use ICT as educators	• how teachers think about ICT • present practice • sharing practice
Teachers' skills, knowledge and understanding of ICT to inform their pedagogy	• curriculum • learning and ICT • teaching and ICT • training and development • expectation for self/pupils
Teachers use of ICT as part of the teaching and learning process	• influence on teaching • influence on learning
Teachers use of ICT as part of the management process of teaching and learning	• personal use • professional use • administration/management

Table 12 Broad criteria for regrouping coded data

Figure 23 shows the distribution of first level nodes and associated data into the five research framework elements. This figure illustrates the complexity of the linkage between these; connections between further levels of coding would be too

confusing to illustrate graphically. As a result of the regrouping process it became evident that the framework element concerned with pedagogy had the highest number of links to it.

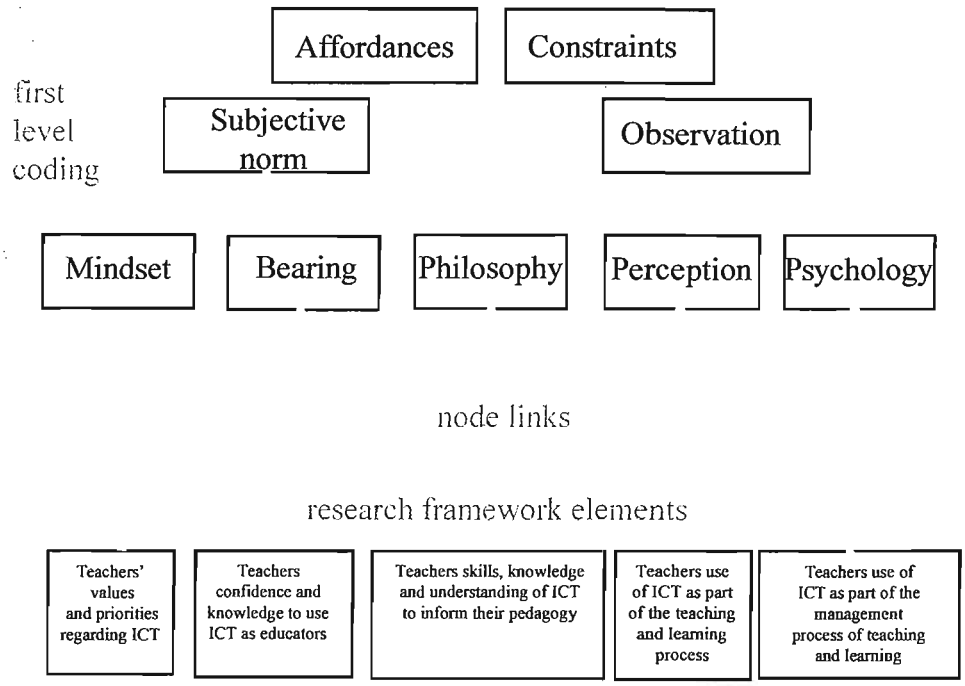

Figure 23 Correlation of level 1 coding to the research framework elements

During regrouping the node links between the multi-concepts of attitude (and other level one codes) the research framework elements were preserved. In this way the integrity of the data was maintained. This connection was necessary to enable meaningful and relevant relationships to be identified between the multi-concepts of attitude and those indicators that identify them.

4.7 Phase 5: The art of interpretation and presentation

This phase corresponds to Moustakas' phase of ***creative synthesis.*** Denzin and Lincoln (1998a: 30) talk about the art of interpretation as the act of making sense of all the empirical data that is collected. The interview, observation and questionnaire research instruments produced a vast amount of raw data, which prior to being interpreted had to be managed and coded. The construction of the interpretation (ibid.: 29) consisted of coding of the field notes obtained from a number of passes through the data, which then lead to the synthesis of the coded data making it ready for interpretation. The presentation of findings, analysis and

interpretation of the data provided the text to enable conclusions to be drawn and this research to be presented as a written thesis.

4.8 Summary

The research design for this study has evolved through following the theoretical guidance provided by the literature. An interpretative/constructivist paradigm was chosen to support a multi-method qualitative strategy using interview, questionnaire and observation to fulfil the requirements of between-method triangulation. Triangulation was used to strengthen the validity of the truthfulness, accuracy and authenticity of data collected. The next chapter deals with the presentation of findings, analysis of the collected data and interpretation.

Chapter 5 Presentation of findings, analysis and interpretation

5.1 Introduction

This chapter presents the analysed and interpreted coded data seeking identifiers that can suggest teachers' attitudes to ICT in teaching and learning. The identification of these provides an insight into the feelings, beliefs and behavioural intentions, regarding ICT, of the sample group. The structure of the research findings is described in relation to the research question, leading to a detailed presentation of the findings.

In excess of one hundred and twenty thousand words of raw data were collected from twenty-two teachers. These data were collected through rigorously developed and validated research instruments thus providing rich and valuable content. Where indications of value are used they are purely to show the strength of the feelings, beliefs and behavioural intentions of the participating teachers.

5.2 Structure of findings in relation to the research question

The key question addressed in this research is:

> ***What attitudes do teachers' have to ICT in teaching and learning in primary education and what factors underlie them?***

The research question focused on the five multi-concepts of attitude consequently the conclusions have to be presented using them. The findings in their raw state do not provide the direct answer to the research question. However, presenting the conclusions within the five multi-concepts of attitude do.

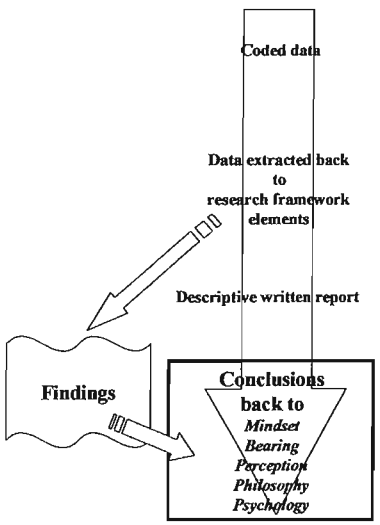

Figure 24 Final steps

To answer the research question a number of steps were taken starting with data collecting using interview, observation and questionnaire. The raw data was coded

and then regrouped into the research framework elements. Regrouping the data in this way enabled the responses presented in this chapter to be mapped directly to the research framework. Figure 24, diagrammatically illustrates these stages. Working within a research framework allowed me to gather information that provided an insight into each teacher's experience, opinions, aspirations, attitudes, beliefs and feelings. As previously stated I considered that by devising questions within the research framework would illuminate each particular concept of attitude more effectively than just wide ranging questions for example, 'What bearing does ICT have on you as a teacher?'.

5.3 Values and priorities regarding ICT

The values and priorities that teachers' place on ICT in teaching and learning are probably the most important indicators of their attitudes towards ICT as they provide an insight into the thinking that informs judgements about its use.

5.3.1 Thinking about ICT

Talking to teachers about the way they think about ICT has shown that the teachers in the sample group view ICT in three basic ways. The first is that it is seen as a functional, '*tool to use all the time, wherever possible*' and that it is, '*important we provide as much as we can for the children*' however a note of caution is sounded by one teacher who thinks that, *'it can aid and assist it can be great for the learning and teaching but it doesn't take over from the teacher'*. The functionality that ICT is seen to provide is described in the following statement:

> *'...it's good for problem solving any lesson they can learn something through it. You can do it through science, you can do it with Literacy, maths there's something in ICT that can help'* (Interview 13).

The second way of thinking about ICT is wider ranging in that it reflects on the potential that ICT can offer as a way of preparing children for the future by equipping them with the skills and abilities necessary for its effective use. A number of comments support this way of thinking, with one typifying them:

> *'I think it's going to involve everybody's life in some way, most jobs nowadays will require some sort of ICT literacy, ICT skills um... I think we need to enable the children to become confident so they will not be left out in which ever career they choose and also to access the richness and the*

wealth of information that you get through the variety of ICT skill' (Interview 4).

While still considering the future needs of pupils other comments indicated the teachers' responsibilities and commitments:

'...the philosophy that if you use it well and you've got a good idea of where you're going I think you're just preparing the children for the world that they are living in so as a teacher that's your job' (Interview 11).

'...and I think we need to build in cross curricular links and it promotes so many skills that can be applied to so many different subject areas that we really do need to plough on with it' (Interview 20).

The third way of thinking about ICT suggests that it is seen as a challenging presence to the teaching role, indicated by the following comments:

' I think teachers are inspirational. I'm not sure ICT is inspirational I think it can be motivational. Um... I still believe in direct contact with children and I think sometimes it's a secondary thing' (Interview 8).

' I am quite adamant that you have to become a very good teacher first because I do think that sometimes it's like ICT is going to take over as the teacher and you don't really need that input' (Interview 5).

5.3.2 Feelings about ICT in primary education

When asked the question, 'what are your feelings about ICT use in primary education?' a number of themes emerged including issues about delivery, value for teachers, value for pupils including the need for skills teaching and ICT as a subject to be taught. A small number of teachers were concerned about issues of delivery, *'... I think there are still enormous problems. You take a class into the suite and some of the computers don't work or the printer doesn't work or there's some other problem'* and the need for, *'equipment needs to be up to date and reliable - comparable to what is found in the home'.* One teacher makes a rather firm comment regarding the need to think about the suitability of use of the equipment:

'Use it for the purpose it's meant to be used for - is how I feel about it and therefore teach with it for the genuine purpose of - if you're using an interactive whiteboard not using it as a glorified whiteboard but using it because it is an interactive board' (Interview 15).

Where these comments indicate concern it is possible that funding for equipment and training may alleviate them. The following comment however, questions the

whole issue about the position of ICT and the perceived over enthusiasm in some quarters to invest in ICT equipment at the expense of other areas of education and implies a feeling of dissatisfaction:

> *'I think there is quite a lot of benefit to be had from it but I also think that a lot of money is being invested into ICT, which could sometimes be better spent in other areas. I think it's sort of a bit of a buzz thing for some schools and some education authorities perhaps and you know for flashing out buying interactive whiteboards and computers and that kind of things perhaps some of the money could be better spent on other things'* (Interview18).

A contrasting view is taken by another teacher who feels that, ' *I don't have any problems with using ICT at all. In fact I wouldn't be able to do my job as successfully as I do without it'.* The value of ICT as a vehicle for teachers to engage pupils' attention in a multimedia manner is highlighted by the following comment:

> *'The children are used to everything they see on the television and videos and things and its jolly hard to stand up and be a teacher and introduce new things in an interesting way that will capture their imagination if you haven't got some ICT to do it with really'* (Interview 1).

In the same vein the value of ICT in the teaching process is recognised for the immediacy of it, *'because you can, you know easily move things and bring things up quite quickly that would have taken quite a long time'.* The following comments, referring to ICT as a tool for resourcing teachers' lesson preparations, demonstrate the value, '*it can bring to a teacher, it can be just a good teaching tool, it can be a good way of resourcing yourself as a teacher for your planning and saving the paper marking side of it'.* ICT can also be used to fill in teachers' resource knowledge gaps, *'...when I've come across a topic, like teaching Islam or something where I've just had no idea really and using a search engine to just give me links that helps me present it in a child friendly way'* (Interview 17).

Similar questions were asked in the questionnaire and interview regarding the use of ICT in primary education; the questionnaire asked for opinions and in the interview respondents were asked for their feelings. The questionnaire being the first round of data collecting was devised to establish a position. Interestingly, the

questionnaire produced more answers that identify the need for skills teaching than the interview. A variety of reasons for skills teaching were given, ranging from, *'I think skills based ICT should be heavily focused in lower juniors'* through to a consideration of how pupils apply the learned skills, *'there are areas where skills that need to be taught on their own before ICT can be used in other subjects'* and *'teaching children key skills that they can apply to their own work'* to *'lessons in skills need to be taught to help children understand and progress in ICT'*. The interviews also produced a range of similar views, '*we need to you know make sure that they know a full range of skills by the time they leave us'* and, *'I think it needs to be taught as a tool and to teach the basic skills in order to use it as a tool for future projects'*. The following comment encapsulates the views about skills teaching:

> *'I think it's important that the children start from Reception and learn their skills all the way through especially with simple things like word processing, (...) In the sense that the children need skills and they need to be able to learn skills and then apply it to other situations, which is very important, which is something we do a lot of'* (Interview 13).

5.3.3 Professional development

When asked about the values they placed on their own professional development teachers' responses ranged from a view that, '*I don't think we've got a choice because if we're going to prepare these children for tomorrows world the we owe them'* through to *'ICT became a requirement without sufficient prior training of teachers'*. A number of comments suggested that lack of funding and lack of time were thwarting professional development, '*Teachers struggling to learn as we go and juggling too many other demands on their 'expertise'.*' Two comments suggest an attitude that includes awareness that professional growth and development is part of teaching,

> *I'm continuing to improve my attitude and skills towards ICT because I realise that that is essential for my own professional development and the children I teach* (Interview 19).

> *'...you will always need the training because things are changing and updating and I would like to keep on top of what's happening in ICT*

because otherwise you get stagnant you get stuck in a rut and I really don't want that to happen to me (Interview 9).

Regarding the priorities of professional development needs, many of the teachers identified training to use the interactive whiteboard. The reasons ranged from needing to become more effective users through to exploiting its potential and interactivity:

> *'Um...would say that I would need more training or more advanced training on how to use the whiteboard because once you've learnt the basic skills I almost feel like I'm not using it as I should be and there's got to be something else out there but at the moment all the training is just basic skills'* (Interview 13).

The reference to being more effective users suggests that these teachers' training priorities are, at present, focussed on the use of the technology as a tool for their teaching. This study is not aimed at identifying attitudes differentiated by age, however it is interesting to note that younger teachers have mentioned the age issue. One suggested, '*that training needs to be given especially to more senior staff who are not as computer literate as younger staff*'. Another is concerned about teachers who may not have received ICT training at college;

> *'because there are so many staff who are already in the schools, who have got a good few years of teaching left in them but who may well have missed the training within their teaching education* (name of college given) *who could do with a lot* of *training because they are going to use it anyway'* (Interview 17).

This view, if widespread, could have implications regarding attitudes within schools, be they supportive or otherwise, possibly affecting working relationships, sharing practice and professional development

5.3.4 Feelings about training

The common thread that links all members of the sample group is that they have either undergone NOF or NQT training after 1999 and have therefore, in theory, achieved the Expected Outcomes (TTA, 1998). Teachers who have come through the NQT system after 1999 have differing opinions about the quality of ICT input into their teacher training. The high profile NOF training received much adverse comment, the most frequent being that it was unstructured and lacked

differentiation in two areas, namely that differing skills abilities of the teachers were not taken into account and that differing year group objectives were not considered. In addition to the comments made regarding the quality of the training there were also suggestions that procedures for completion and certification were not consistently enforced. This is illustrated by one teacher's comment that, '*we could basically dip out of the bits we didn't want to do and yet we got a certificate at the end and it didn't really help anyone there was too much money and it was just useless'*. One affect of this is that some teachers discounted the perceived value of the training and certification, with comments such as:

> *' NOF training I did not feel was well taught, was not well presented I didn't really understand what I was doing, why I was doing it. I didn't feel there was enough hands on we were left to our own devices, although we were signed off I didn't feel at all more confident, it was just an introduction really. I didn't like that'* (Interview 8).

> *' I think the training has been pretty poor, in all fairness. Like the NOF training, I know there's a lot of money been put into the NOF training and my experience of it wasn't a very positive one. Then I just did it to get through it and say I've done the NOF training. But I don't think it equipped me with any more ICT skills that I didn't have already'* (Interview 20).

Conversely, some responses in this study indicate that the more positive approach taken to training resulted in higher perceived benefits:

> *' Yeah, it did. We had to do different tasks and um...yeah I feel that it helped but it was my own knowledge as well, practising at home and I had a boyfriend at the time who was a computer manager so he helped'* (Interview 5).

> *' So I made I did that, when he said you know you do this, this and this I actually did it and wrote it down and I think if I hadn't have done I don't think I would have benefited as much'* (Interview 7).

Some comments were made regarding targeted training pre-1999 which indicated that this type of specific course was valued as being beneficial. Interestingly one teacher referred to earlier Royal Society of Arts training, which they felt was more targeted and pedagogically focused than the NOF training. In the questionnaire teachers were asked to comment on whether,' Serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum' (DfEE,

1997a: 24). Of the twenty-two responses to this statement only two teachers felt, without condition, that they had personally achieved the aim. Several of the other responses indicated some forms of agreement but many had caveats referring to need for time, more resources and adequate support to be able to achieve the aim. The majority of comments about training received were aimed at the NOF training, however the general tenor of negativity was broken by only a few positive outcomes. Some teachers felt that the time allocated for the training provided an opportunity to practice skills and improve their confidence in some things like word-processing. This view is represented by one such comment:

> 'So *I'm not sure I think it helped because it gave you yes I can do that and it just kind of affirmed the things that you know that you can do and you were actually doing quite well'* (Interview 7)

5.3.5 Money issues

Many concerns about money issues were mentioned in both the interviews and questionnaires. The major concerns are with ICT being a high cost part of the curriculum due to the pace of change of technology and the difficulty to maintain it financially. One ICT co-ordinator estimated a 3-year life span for the technology in their school and that investing in the equipment is fine, however they expressed concern that the ongoing support costs, including training, to use the equipment are not always sustainable. ICT systems need to be maintained in order to ensure their reliability if they are to be used effectively to support pupils' learning and development and retain teachers' confidence. Equipment failure and the uncertainty of what is around the corner can encourage an attitude of disillusionment and ambivalence from teachers:

> *'...that even though IWBs* (Interactive Whiteboards) *have recently been introduced there is an expectation that something else is around the corner, which will need funding, will require training and commitment'* (Interview 2).

This is related to a concern expressed by another teacher who feels under pressure from parents who perceive that the Government is providing funds for all the resources required for ICT. ICT initiatives have provided ring-fenced funding for ICT and training but once this is stopped, funding issues will reappear. Historically

parent teacher associations have in many cases raised funds for ICT equipment in schools. If these associations are starting to question why they should be making financial contributions to support the purchase of ICT equipment, schools with small budgets or those that are in less affluent catchment areas may suffer. One teacher strongly believes that more funding should come from the Government:

> *'I think if the government really wants it (ICT) and really wanted it to take off, then they've actually got to put more money into it. They've got to get, you know, the workforce in every classroom. They've got to get laptops in every classroom , the whole idea that every teacher has got a laptop - yeah? You know, I've got one, it's mine, I want it, and I think it's, you know, they say every teacher has a laptop - no they don't, it's simply not true. So I think that a lot more still needs to be spent if we're going to keep abreast of what's going on'* (Interview 14).

A few unenthusiastic comments were made towards the financial demands that ICT makes on school budgets, including the view that ICT is having a detrimental affect:

> *'on other subjects areas or other needs in education, especially since a lot of hardware, software goes out of date so quickly and there's renewed needs all the time'* (Interview 8).

A dilemma faced by one teacher is that they believe that too much money is spent on ICT and that priorities have gone slightly askew, however they do like their IWB and feel that they need to know how to use it effectively. These views indicate a perception that ICT is in competition for resources with other subjects rather than being seen as a means of supporting them.

5.3.6 Feelings about Government expectations

When asked the question, 'what is your opinion about the emphasis placed by the Government on ICT in teaching?' as expected there were a number of comments relating to the importance of ICT for children in today's world, a social concern developed further, later in this chapter, when the role of ICT in the teaching process is discussed. Many of the answers to the question were positive but predictably came with purposeful and meaningful caveats. A number of teachers felt that the Government emphasis is right and that funding has been made available to implement its initiatives. As one teacher commented:

'So I think the emphasis that we need to do it is right but I think you know like everything it should come with a matter of caution. And teachers need to have the strength to realise that ICT is not going to link to everything they will teach every lesson' (Interview 7).

As a result of Government initiatives the expectations are that ICT will be firmly embedded in the teaching process. Dawes' (1999) view that teachers are selectively welcoming of suitable change is substantiated by a number of teachers in this study and is typified by the following comment:

'I think because the money is there people think oh we should be using it, you know we've bought all this equipment we should be using it. But I really do firmly, as I've said before, I firmly think it should be used for purpose not for novelty and I don't think there should be pressure on you to use it inappropriately. So yeah I do feel sort of an element of pressure from that and I think (sigh) there's an element of pressure about, it's all new therefore it must be all good'. I think well it's not that new and it doesn't always mean that it's good. I just think that we should be careful about how we use it' (Interview 15).

However the expectation to use a piece of ICT equipment, without training, purely because it is there or has had a lot of money spent on it is counterproductive insofar as it can give rise to feelings of professional insecurity as considered by the following three views on the initiatives:

'...presumptive in the sense that Government pressure to include ICT in teaching and not all people took or take to ICT. The need has made teachers feel uncomfortable about their own confidence and ability as teachers'
(Interview 11).

'You must have this but there seems to be no explanation as to why we ought to have it. We are told we need X, Y and Z, you're not an effective teacher anymore if you don't have an interactive whiteboard' (Interview 9).

'I think that it should be really important to the children and to teaching but I do think that sometimes teachers are forced to use it when perhaps their skills aren't up together with ICT and the training hasn't been there for certain things such as the interactive board. They are sometimes just put in a classroom and you're expected to use them' (Interview 5).

5.3.7 External pressure

Teachers are not only subjected to statutory pressure but they also have other external pressures of which some are real and are part of the day-to-day work

experience whereas others, while equally real to the teacher, are self-imposed. Taking these in turn, a significant concern of the teachers in this study is that of inspections whether they are from OFSTED or initiated by the local authority. Pressures felt by some teachers include having to respond to the requirements made by the local authority with regard to performance assessments for pupils and the pressure of being under scrutiny, *'for reasons that are not made clear by the authority'* are examples of performativity as discussed by both Jeffrey (2002: 531) and Ball (2003: 215). If teachers feel that their performance is being measured either through their pupils' progress or other unclear means they may, as Ball believes, be subject to a significant and negative affect. These types of performance measures are regular and frequent, however the looming iceberg of OFSTED brings its own anxiety. While OFSTED inspections are not frequent, they have still been mentioned by a number of teachers of which some believe that during the inspection ICT should be seen in as many lessons as possible. One comment is indicative of this perception, '*So I guess if OFSTED came to watch me again maybe I'd have some children on the computer'*. If this perception is accurate, it challenges the attitude that ICT should not be used for 'the sake of it' but should be used appropriately or that alternatively teachers should have the strength to say that ICT is not going to fit into a particular lesson.

Another external pressure perceived by a number of teachers is they believe that the children they teach know more than they do in some way. Comments ranged from, '*Worried about not keeping ahead of children'* through to:

> *'...within school, from parents as well really. I suppose not directly but because ICT goes on so much in a lot of parents' homes, at our school, I feel there has to, there is an assumption that you will know as much as they do and that their children will be encouraged to use ICT in their lives'* (Interview 8).

These comments are the extremes of views, however there are a number of stages in between including that of, ' *I lack confidence in teaching to children because I think they probably know more than me, '...but I am willing to do it if I know how to do that properly'*. The extensive ownership of computers in the home gives rise to some interesting views regarding ICT, '*it's very sophisticated now and children*

are much more competent in its use partly due to them having their own computers' and *'keeping up with or ahead of the children and being able to identify misconceptions'*. This perceived notion is very real to many teachers in this study, however Granger et al. (2002) suggest that the philosophies of pedagogy are influenced by the characteristics of the 'external community'. Teachers need to be aware of what and how pupils use ICT outside the school, they need to have some knowledge of what their catchment community perceive, '...as the work of education and community perceptions of what work ought to be' (ibid.: 487). Another teacher's attitude is that, '...p*robably yes, yeah it has. Probably in the knowledge that the children bring, I think well I've got to teach these children so I ought to learn what I'm doing really'*. This is an attitude of 'pupil up' as opposed to 'teacher down' learning, however a better strategy may be to consider 'between learning'.

Another pressure mentioned is to do with the preparation of pupils for future education and the impending market place. The view that we are in the age of technology makes it the responsibility of the teacher to, *'prepare children for the work place'* and *'to be ICT literate improves job prospects':*

> *'I suppose the pressure is the responsibility. I wouldn't want to feel that our children were being disadvantaged in anyway when they transfer to secondary school, so I guess that's the pressure we're under is that we need to provide as much as we can to prepare them for the next stage in their education'* (Interview 2).

The above comment, to a certain extent, implies that there is a greater feeling of responsibility regarding pupils' progress to secondary school as opposed to their progress year on year through their primary phase of education. These views are developed further, later in this chapter, when consideration is given to the value that ICT has for pupils.

The role of an ICT co-ordinator in primary schools is unusual, in that in addition to the common requirements of a subject co-ordinator, it also carries the responsibility of having to respond to technological issues and associated needs of colleagues. A number of pressures that ICT co-ordinators identified are to do with ICT

equipment, including resolving software or hardware problems. On a people-centred level, the co-ordinators mentioned issues regarding the ability and confidence of their colleagues and their requests for advice, guidance or assistance. All these elements have to be handled alongside their own class and teaching responsibilities. Having somebody on site who can fault find alleviates pressure on other class teachers to solve technical problems that may not be within their competence.

The second group of pressures are concerned with those that are to a certain extent self-imposed, but equally real. As one teacher remarked:

> *'I would say it's as a teacher now in the present day you've got to use it, not just because you're pressured into using it it's for the children's sake because it's relevant to them and their life style but it's not necessarily the be all and end all of a child's learning experience and there are other aspects. I am a big believer in children developing socially and learning how to speak and how to listen and how to care about other children and you know the social development side of things. I don't know whether ICT tends to take anything away from that or not, I think it does to some extent you need a balance'* (Interview 19).

In this instance this teacher sees the necessity to use ICT, but at the same time indicates a potential lack of understanding of the place of ICT in teaching and learning. ICT can be used to encourage and develop social development through collaborative learning and interaction between pupil, teacher and the technology. In a similar vein another comment was made regarding teacher responsibility towards their pupils' computer use, *'...most children have access to a computer at home and the Internet and I think they should know how to use it safely and correctly'.*

An unusual aspect of time pressure is the perception that, metaphorically, you have to run to keep in the same place. This is shown in two different ways, first where one teacher says:

> *'I mean there's almost too much to choose from now and then remembering where everything is and it's just and with teaching wise I think it's trying to get those cross curricular links as much as you can. But then for me it's having the knowledge to do that as well, so it's almost like sometimes I'm working against myself. I've just got to grips with that and so for me it's such a fast, fast track of*

learning that you just think right OK. I achieve something and then there's something new come along, so I've got to learn that all over again' (Interview 20).

and second where time and a feeling of guilt are conflated, *'I'm becoming increasingly guilty about the fact that I'm not spending as much time as other people do on ICT'*. Both of these comments indicate feelings of commitment towards ICT, however these perceived time pressures could lead to an attitude of resentment. Teachers also need to have a work life balance and this is exemplified by the following comment:

'It's not something that I would choose to do if I've got time I would rather read a book I wouldn't choose to go and sit in front of a computer. I'd rather read a book or do some nice cooking or be in my garden' (Interview 6).

Teachers question their self worth and confidence through comments that indicate feelings such as, *'I've been on various training courses where people have known exactly what to do which has made me feel very lacking in skills and really undermined my confidence'*. Another felt that they were not a worthy teacher because they do not have an IWB or laptop. All these pressures, whether real and external or real and self-imposed, should be considered as genuine but also separate.

5.4 Confidence and knowledge to use ICT

This section considers the issue of teachers' confidence about and knowledge to use ICT. It addresses the significance of changing views over time together with a degree of teachers' self-assessment and views on ways of developing knowledge of ICT.

5.4.1 Rate present practice

The sample group of teachers were asked to rate their present practice with regard to ICT. The majority of their evaluations concerned their skills ability as opposed to their pedagogical ability. The answers are indicative of the mindset of the sample group, where ICT is very much centred on the teachers' ability with and knowledge of the systems and software, effectively focussing on these elements

rather than their pedagogical application of it. The following comment exemplifies this mindset:

> *' Basic skills I'd say I'm probably out of ten I'd say I'm probably a 7 out of 10 teacher because I'm confident in my own subject (...) So I hope I'm a sort of a 7 out of 10 teacher of ICT. In terms of using it in general lessons I'd probably say I'm a 4 out of 10 with the ability of being a 7 out of 10 but I don't have the equipment. So I know that I could do it a lot better than I am doing, I could do it better and I'm enjoying it and the fact that it has got better'* (Interview 15).

The teachers were happy to evaluate their own practice and a common theme running throughout almost all the responses was that the teachers rated themselves somewhere between fair to very good. However in some instances teachers did identify areas of their own practice that they considered could benefit from further development, as one stated:

> *'Oh, gosh! I would say I was good at using it but I almost need to go, especially with the whiteboard, that next step how can I use it further in the classroom? But no I would say I was fairly competent with ICT'* (Interview 13).

One teacher felt that they were not able to rate their own practice for the following reasons:

> *'I don't know because nobody has ever watched it so I wouldn't know. I'm not able to compare myself against what other people do. I think in your classroom you tend to be quite isolated you know. You think, you might think oh that was a good lesson well someone else might come and say yeah but this class were doing that and this and you think oh but you know I've never had any feed back to be able to say'* (Interview 7).

5.4.2 Change of philosophy over time of teaching

Asking teachers whether their thinking about ICT has changed over the period they have been teaching produced some interesting views. Their comments fell into two sets of views, those who considered the technology first and those who indicated views encompassing both changing pedagogy and technology. There was no evidence to show that negative views had developed. A few comments referred to being, *'more accepting of it, see the value of it'* and *'...my respect if you like for ICT has done a full circle and I'm enthused'.*

The first set of views focussed on the changing technology, the pace of change and the means and style of its introduction. The following statements exemplify these views:

> *'...such a high profile thing and after having the whiteboard for a year it would be very hard to never not have one and I'd find it hard to go back to writing things on the flipchart rather than just saving it bringing it up and then it can be used the next day. It's silly things that I take for granted with it I think'* (Interview 13).

> *' I think it's interesting to see how things are progressing and going from, my time at teaching we've gone from one computer in each room to an ICT suite to interactive whiteboards its going really fast I feel'* (Interview 5).

The second set of views was more concerned with the acceptance of ICT and a changing and developing pedagogy:

> *'I think probably I'm more heart felt with it, I probably could have spouted off a philosophy quite nicely without having a lot of depth to it to start with just because you get quite trained up nicely to say good things. I think now that I'm more seeing it used practically I have more of an insight in where it can go and have more enthusiasm to get the kids up and using it'* (Interview 17).

> *'You know we're going to do something on the computer and to be honest it would have been word processing and I don't remember physically sitting down and you know it's a transition from the go and type it up to the this is what you can do. (...) I think you can't just take each of the lessons in isolation I think it has to build the picture as a whole and I don't think I would have thought about it that way'* (Interview 7).

5.4.3 Sharing practice

Opportunities to share practice with colleagues was seen to be a positive experience and as one teacher succinctly stated that it provides, *'opportunities for staff to interact with each other'*. A few concerns were raised about the diverse mixture of teachers in schools, with regard to confidence with ICT. One teacher felt that they would rather share their knowledge than practice as they, *'would be loath to try and raise the bar too much too quickly for people who may be didn't have the background or the confidence'*. However, a few teachers thought that opportunities to work with, or watch demonstration lessons by, 'experts' would be valuable. Sharing of pedagogy, knowledge and resources were also mentioned. Only one

teacher mentioned that they regularly met with colleagues from other schools to share concerns and to pick up ideas.

How do teachers gain the confidence and knowledge they need to use ICT in their roles as educators? In addition to training courses such as the NOF, they work together and share knowledge, skills and practice amongst each other, *'just informally, just you know, walking past and somebody grabs you and goes oh do you know how to do this?'* The example below describes an opportunity as to how sharing practice can happen informally:

> *'Oh yes, for example I've installed on the system websites that I've found that I've found extremely useful in history and R.E. and everything else and any worksheets that I've produced or I've found on the Internet or I've made up myself I share with the appropriate colleagues'* (Interview 4).

Teachers feel the need to share practice amongst themselves, however there is not the time to do so, consequently the opportunities happen on a random and unplanned basis as shown by the following comment:

> *'I often have people saying how can I do this or what would you do you know. How can I make this lesson better and that sort of thing? So I can, they don't we don't have the time or the opportunity to actually go in and observe or for people to come in but passing on sort of by word of mouth if you see what I mean'* (Interview 3).

The perception that sharing the knowledge, skills and understanding of ICT has a place and is mainly seen as beneficial, however one teacher believes that:

> *'... there's a time and a place for just using a piece of software and actually getting to grips with it yourself but then its quite nice to be able to share and cut peoples frustration of not being able to do things by sharing'* (Interview 17).

Attitudes towards sharing practice are not always positive or readily assumed as one teacher commented:

> *'Some will be absolutely brilliant and will just want to share everything with you and want to be like share their knowledge, help you. Others will be totally closed off in their own little bubble and they will feel offended if you know asked to sort of either share stuff or they're doing something, no your doing something they're not or the other way around, I don't know, they get very, very strange. It's al about opinions and it doesn't matter which school you're in, well it does, it matters totally. All schools are different all teachers are different all heads are different'* (Interview 19).

Time availability is a concern, however allocating time to learn software and operation of peripherals is perceived as not as important as time for other tasks. These comments suggests that the value given to ICT is somewhat less than that given to other tasks:

> *'It would be nice to have a bit of allocated time maybe sometimes to just say we'll go and find some Internet links for your subjects this year or go and explore this program if you're going to use it next term, see how you can actually use it. I'm sure I could use my PPA (Planning, Preparation and Assessment) time for that but there's so many other things that I need to do'* (Interview 17).

> *'To keep up to date with packages, keep up to date with the software you have to teach for that year group, that's something you have to take time out in order to do, preferably time that's sponsored time rather than you know your own time'* (Interview 15).

Not all sharing of practice happens on an informal basis. Planned and structured sessions are also integrated into the working day, however only one teacher refers to sharing pedagogical practice:

> *'Well here because I'm Numeracy Co-ordinator I have to do a couple of staff meetings showing certain websites or showing how to incorporate ICT within a Numeracy lesson. So I've done that and that was received fine and everyone was either doing it or was fine to be encouraged to do that'* (Interview 19).

It is evident from the above comments that the teachers in this group believe that it is beneficial for them to have opportunities to share practice regarding ICT, however it would appear that opportunities happen on a random and unplanned basis. When opportunities are timetabled such as staff meetings the time is generally spent on sharing resources and developing skills.

5.5 Skills, knowledge and understanding

This section investigates teachers' skills, knowledge and understanding of ICT and how it informs their pedagogy. The areas covered include knowledge of curriculum expectations, the skills using ICT in teaching and learning and the understanding of the value of ICT in teaching and learning, both for themselves and their pupils.

5.5.1 ICT integration into the curriculum

> Pupils should be given opportunities to apply and develop their ICT capabilities through the use of ICT tools to support their learning in all subjects (with the exception of physical education at key stages 1 and 2) (DfEE, 1999: 39).

This statement from the National Curriculum Handbook for Primary Teachers in England outlines the responsibilities of teachers to their pupils, regarding the use of ICT in the learning process. Questioning teachers about their views on the integration of ICT into curriculum subjects provided an insight into both their understanding of and influences from the National Curriculum statement. A range of feelings were expressed including an indication of where ICT integration could lead:

> *'...because obviously in the future then I think ICT will be 90% of the curriculum or at least ICT will be used in 90% of the curriculum. Only handwriting will be left pretty much is the place we are going to get to but um...yeah I think you know it's going to be done and it's got to be done'* (Interview 3).

A number of thoughts regarding the integration of ICT into the curriculum are centred on the teaching rather than the pupils' hands-on learning with ICT:

> *'Subjects like art, being able to have access to the Internet in your classroom and to able to find artists' work and things like that on there is great but there's not so much ICT that I do on the computers linking art to it. I think I'd want to do more creative things, get your pencils out, let's build things with clay and go down that route really'* (Interview 17).

This comment indicates that sometimes teachers' 'default settings' are set at 'teacher teaching' as opposed to 'pupils learning' with ICT. While there has to be a place for physical hands-on creating for pupils, ICT may be used as a tool to provide stimulus for subjects that involve physical creating. The following view is more pupil focused insofar as the idea is that ICT can assist with their learning:

> *'I think it's got to be handled with care is how I feel. I mean there are yes it can go into most subjects I don't see why it has it's a tool. There are areas where yes it is useful but things like yes you can use it to help with your designing for DT but at this level you still want the children to make the things, you don't want it on for the sake of it'* (Interview 9).

A more considered view, regarding integration across all subjects, is that ICT should not be forced into lessons and that teachers should be selective about its use to ensure that it does not get in the way of the learning objectives is exemplified by the following remark:

> *'I do think we've got to be brave enough as teachers to say no I can do this better; ICT isn't the most appropriate thing here. So yes we all consider OK can ICT help me in this particular unit of work whatever curriculum area it is and if you don't think it can don't use it for the sake of it. You need to be selective'* (Interview 2).

This comment is in line with Gibson (2001) and Fullan and Smith (1995).

The attitude that teachers have to be 'brave enough to say no' is an interesting one and may provide an indication that teachers feel their professional judgement is being challenged. This reflects the attitude that teachers sometimes feel that they have to use ICT whenever and wherever possible. A further considered view is that ICT, ' *shouldn't get in the way of that learning objective; it should help them (pupils) with that'*. A concern for one teacher is the notion that ICT might replace all other media of learning, '*I would like to think that there would be times that they would choose, in different subjects, to do things in different ways like they do already'*

5.5.2 Deciding how to use ICT and what influences the decision

When questioned about what influences their decision with regard to using ICT in a lesson, the responses raised a number of interesting insights regarding teachers' awareness of the use of ICT in the teaching and learning process. One teacher explained that there are areas of ICT that have to be covered (the reference here is to the Qualifications and Curriculum Authority (QCA) Scheme of Work for ICT) and these are mapped out in long to medium term plans:

> *'... so that we can say OK if it's spreadsheets this term ... pick that up in maths, if it's multimedia then that's more appropriate for me to pick up in the geography or the history'* (Interview 1).

This view demonstrates a certain understanding of the use of ICT where it provides an environment in which the teacher can add her/his own creativity to teaching. A number of teachers talked about learning objectives influencing their decision;

'learning objectives and what the required skills outcome, how do we get them to learn most effectively, how do I cater for learning needs, how do I cater for resourcing'. A teacher who professed a lack of confidence with using ICT provided an explanation of how they use ICT to provide pupil-centred learning:

> *'...to me the teacher input is the first bit of the lesson then the children can use that. Group work certainly it's very useful for paired work so independent learning from that point of view as part of a lesson. Once children have been given a task or learning situation to develop themselves (...) I also think it can be very good for differentiation too because you can prepare something in advance sometimes which is specific for children, either able children or less able children, without forgetting that motivational thing for children in the middle too'* (Interview 8).

Once again a significant number of reasons given for the use of ICT mainly refer to teacher use rather than pupil use. The most open example of this is given in the following statement:

> *'It really does and I said not having an interactive whiteboard, not having an interactive whiteboard in the classroom hasn't helped me in that front. I know I'm lagging in behind some of the others so it's rather more about me using ICT than them using ICT because I haven't got access to it to use as much as I would like'* (Interview 14).

Other uses of ICT range from pure teacher use where it is used as a presentation medium, *'it's to help myself prepare the resources in advance (...) I'll prepare a flipchart on the computer'* to using interactive teaching programs because,

> *' if they are relevant to what we're doing and more effective than something you can do on a whiteboard and usually they are (...) on the interactive whiteboards so you can just get that up and it's just so much easier'* (Interview 13)

to,

> *' they like seeing the pictures in colour and they like moving things around and it's just an automatic way to get better behaviour in class because they want to be a part of it and they want to use it'* (Interview 17).

The presenting of information on an IWB is seen as a way of enhancing learning. One teacher explained what they consider to be enhanced learning:

> *'So with the Literacy you get can a piece of text up and with the interactive whiteboard you highlight adjectives, full stops and capital letters and things like that whereas you, although you can probably do that if you blew up a big piece of text it would be a lot harder for the children to read um because you can't ever really blow it up to that size. So basically we kind of look at*

what's available and just decide whether it's actually going to enhance their learning or not' (Interview 16).

Teachers should use the interactivity and multimedia attributes of ICT judiciously to enhance their pupils' learning, otherwise the whole process becomes a multimedia circus as exemplified by the rather exaggerated but pertinent response to the use of ICT as a presentation tool:

> *'Would they be going, 'Oh' you know would they come out of the lesson going, 'It was great they had 43 slides in 23 minutes and this slide showed that and the way they faded'. And then you ask them about the learning behind and they go, 'Oh I don't know but it was really colourful and I liked the strobe effect on that and the way this slide into that and the music was good'. If they haven't learnt anything other than how whizzy the slide show can be or whatever then there's no point doing it'* (Interview 22).

Moving from strongly focused teacher centred behaviour to that of the more 'pupil hands on' influence is exemplified by statements that refer to,*' Internet games sites in our plenary session so that's been really fantastic and actually we did it in Literacy'* to having the pupils use the Internet for research because, *'I cannot supply them with enough information even with our wonderful library here there is a much wider choice of information on the Internet and with images and all sorts of things'*. These comments demonstrate that ICT can support a variety of uses, however deciding why to use it is less clearly explained.

5.5.3 Role of ICT in the teaching process

In both the interview and questionnaire the role of ICT has been viewed as a pedagogical construct and social necessity. ICT is, *' another tool in the teachers armoury to enable them you know perhaps engage children in different ways'*. Considering ICT as a, *'good resource (...) you know a different way of showing things in a different, it helps with your, you know give clear explanations of things'*. An example of how ICT is used as a resource was given by one teacher, *'... Internet to explain a science thing I've been doing. So you know I think that sort of thing can be good, the only problem is it's probably an excuse not to buy textbooks.* In this instance it is difficult to understand the benefit of using ICT - especially in the light of the attitude that ICT is a high cost resource as identified previously in

this chapter. A number of references were made to the role that IWBs play in teaching; comments suggest that they are an entity in themselves.

Many teachers talked about the value ICT brings to children, however the value being acknowledged is that of computer awareness and computer literacy as identified by Drenoyianni and Selwood in their research of 1998. It would appear that this perceived role of ICT is substantially unchanged since their study. The *'age of technology'* and *'the future'* and *'it's part of the modern world'* are just some of phrases mentioned. Teachers perceive it to be their responsibility to expose children to ICT to prepare them for the future, whether for future learning or the work place. In contrast, the following comment situates ICT in teaching into the here and now and provides an understanding of the potential role of ICT in teaching:

> *'Children need to be able to use ICT to both gather and use information and also to be able to communicate with others. Primary education provides the initial learning in this vital area'* (Questionnaire5)

5.5.4 Role of ICT in the learning process

This section is concerned with teachers' views about ICT in the learning process and the perception they have of it in this process. Two significant points of view emerge from the responses and although they both consider ICT to be important they identify different facets of its potential capabilities. The first point of view is directed towards developing independent learners by supporting the merging of the perceived values that ICT provides to the pupil. The three following comments illustrate this:

> *'I think the role of it in learning is that if they had an awareness through their ICT training that they are more able to enhance their own learning by finding different things for themselves and being more investigative really with the things that they have'* (Interview 7).

> *'... that children will be motivated to learn and discovery I guess, um... I think it also can be very useful for certain things for consolidation as well and children learning from their own mistakes er... which I see as a big part of independent learning which is something I believe in'* (Interview 8).

'Um I think what its doing and it will do, I don't think we're there yet, is actually giving children far more independence in terms of being able to go and do their, you know their own learning' (Interview 14).

The second point of view recognises the role of ICT in the learning process, however it is more centred on the physicality of the technology as a stimulus for learning as identified by the following examples:

'I think it does because nearly all the children, there are a very few of them that aren't actually fired up. You know if you say right you're going to do it on the computer or why don't we use this program, whatever their preferred learning style is they are all very keen to use it. They are getting it all really it's not exactly kinaesthetic' (Interview 1).

'So whether it's that you take them out in a field and you see a butterfly or whether they actually see on the interactive whiteboard or through ICT that butterfly coming out, it's awe and wonder, isn't it? It's something that's going to get the children's attention and once you've got that, then they will learn and so it's a motivational tool for them' (Interview 2).

None of the views about the role of ICT in the learning process actually showed a negative point of view, however there were variations in the pedagogical understanding of the use of the technology. The majority of teachers identified the motivational nature of ICT in the learning process and that it has made a difference to children's learning. The attributes of the motivational nature of ICT have been defined as, *'encouraging children to take greater responsibility for their own learning', ' learning while enjoying themselves'* and *' should give them confidence and enthusiasm to learn and progress more'*. If some of the features of ICT are used effectively, such as the interactivity of IWBs the view is that pupils will benefit by learning and absorbing more than would otherwise have been the case. At the same time there is still recognition that other media used to support teaching need to be remembered as well. A small number of teachers raised the point that ICT suits some subjects better than others.

Understanding the value of ICT was questioned in a number a ways, the most serious of which was verbalised by one teacher as being:

'Very unclear in both what is expected of ICT and how to apply it. Confusion, a lot of people saying everything to do with ICT is wonderful but no explanation as to why or questioning why' (Interview 9).

Associated with this lack of certainty are views that while pupils appear to be interacting with the technology in both individual and collaborative ways, some teachers are not entirely persuaded of the value of ICT in teaching and learning situations. The following comments illustrate these views from:

the value of using ICT in teaching situations - *'If they haven't learnt anything other than how whizzy the slide show can be or whatever then there's no point doing it'* (Interview 22).

to

the value of ICT to pupils' learning – *'...they quite like looking at the screen and interacting with it whether they're learning better I don't know really'* (Interview 21).

There is little evidence to suggest that the teachers in this sample group have a consistent understanding of the difference between collaborative learning and sharing in the context of using ICT. In this study, collaborative learning is defined as the sense of teacher and or pupils working together to achieve a common goal whereas sharing is more than one person using the same resource during the same activity. The following two responses demonstrate the uncertainty surrounding these concepts in the arena of ICT:

'Yeah I mean I suppose there is a certain amount of collaboration but in the end you know they are just finding stuff on screen. They are talking about what's on the screen they are not really, well they are collaborating yeah you know, yeah they're learning to sort of share' (Interview 19).

'Yeah definitely, it's just got that sort of sharing ethos within the classroom. You know even with my LSA (Learning Support Assistant), *you know we are all working together for the same outcome really now'* (Interview 20).

If there is uncertainty regarding what collaborative learning is then there is likely to be difficulty when developing effective collaborative learning situations. The following statement goes some way to demonstrating an understanding of how ICT can be used in learning as a partner with the pupils and the teacher:

'...but I guess that when they are working together on some task on the computer I think they are more prepared to learn from one another its not quite so me and you, it's a third dimension' (Interview 8).

A few teachers talked about the different styles of learning that children have. One teacher suggested that different styles of learning are ignored in the classroom because of the difficulty of actually organising learning for the whole range of

styles. However, the suggestion is that teachers can use ICT as a support mechanism to stimulate visual, auditory and kinaesthetic (VAK) learners, such that a teacher using ICT in this way has a greater facility to address the different learning styles. In a similar vein the role of ICT is seen as, '*...a support mechanism for supporting VAK learning'*. Comments were also made about the enjoyment and excitement that ICT can bring to the learning process, as one teacher believes,

> *'...it equips them(the pupils) straight away with being interactive within the classroom. It's not so much of the old, children sit down for 20 minutes and it's all chalk and talk, it's getting more of a partnership of teacher and child in their learning, so we're all learning together. I think it's great in creating an interactive and creative curriculum'* (Interview 20).

5.5.5 Value for pupils

An attribute of attitude is the perceived value that is placed upon it. In this case teachers were asked to consider the value of ICT for their pupils. Where teachers identify a value for their pupils, they are also likely to consider that there is a value to themselves. The aim of this section is to identify the perceived value of ICT over and above the necessity of its use. The value of ICT is perceived by how it can support and what it can offer pupils in their present learning. The view that ICT facilitates situations where pupils, '*can work at their own pace at something'* and that it, *' enables the children to continue investigating and consolidating their knowledge'* were expressed. Teachers also believe that ICT has, *'opened up worlds for children that previously would not have been available to them'* and therefore consequently leads to new areas of learning for pupils, offering opportunities for independent learning. The value of ICT is succinctly summed up as providing, *'lifelong learning opportunities'*.

A number of comments were made about the necessity of ICT skills as a need for the future both in the short and long term. The short-term view is that pupils will need, *' to be literate in this area'* and that ICT as a, '*skill that will be needed in secondary education'*. From this latter statement it may be inferred that ICT has value now as a basis for the future. The following statement exemplifies a similar view focussing on planning for the future:

'Because we prepare these children for the, you know, for being adults for the next generation and they are going out to work where they're going to be using ICT all day everyday in a form probably ahead of what they are actually you know experiencing now, so if they're not started off at a very early age to become ICT literate, then by the time they get to the adult world, you know, they won't be able to cut it' (Interview 14).

A number of comments indicated that the development of ICT skills is considered to be important, *'children need skills and they need to be able to learn skills and then apply it to other situations'*. This concept of the value of ICT indicates a view that it is a tool that has to be mastered and used to facilitate and support learning. However the following statement suggests that ICT in its own right is a life skill. The value of ICT seen as a subject may influence attitudes to the acceptance of its use as a medium to teach with and through:

'I think you know all the children need to learn the skills and be able to apply them so whatever they want to do in life really and same with the teachers they need to use it for lots of different things professionally. So I think it's really important. I think it's one of the, one of the vital skills that the children need, as well as maths and English and science' (Interview 16).

5.5.6 Change to the learning process

Leading on from the previous section the following deals with teachers' views about the changes that ICT has brought to the learning process. Reynolds (DfEE, 2001: Preface) suggests that what works in the hardware, software and teacher combination is a matter more of assertion than evidence. One teacher echoes this view and questions the continuing motivational ability of ICT:

'I think it's brought changes, how effective they are I don't know. I think they could be effective to start with, in my eyes it could well be something where the motivating factor of ICT for a short while will improve kids responses to learning and their enthusiasm for it but I think when it becomes an everyday tool, possibly that might sort of level out again' (Interview 17).

The belief that ICT makes the learning process, *'more exciting in terms of it being used effectively; it can be exciting delivery um which means the children absorb more'* and a possible way of this happening is explained in the following comment:

'It has enabled more learning, more access to learning. I'm trying to think how to phrase this. What it's done is it's opened up worlds for children that previously would not have been available to them. So they are able to see things instantly that they would not have been able to see and that's a sad time if you

like books. They can't any longer produce that wonder that a moving picture on the screen can do, so it needs to take a different role' (Interview 2).

This comment not only shows that ICT can affect the learning process but the suggestion here is that there might also need to be a re-evaluation of the resources that teachers provide. One teacher believes that ICT has enabled their low ability pupils to achieve success and it has helped them to provide differentiated challenges for their pupils:

'I think some of the low ability children find they get instant success with the computer, they can you can tell them to type a word and they get instant feedback and they feel that they've succeeded and I think that's helped especially my low ability and also extend my high ability. You can always give them an extension, you can give them a ...I've been doing a lot of sort of I've been giving them a question to go and research on the computer and they've extended their work that way. So I think it has made a difference to how children learn' (Interview 5).

A similar view is that ICT, '*allows them (pupils), I mean they can work at their own level on things and also they can repeat things if they want to'*. Both of these views indicate that ICT can help pupils to develop independent learning skills and can therefore provide teachers with another string to their bow. Questioning whether these examples of using ICT are actually extending pupils is not within the scope of this study.

5.5.7 Good teaching with ICT

The question, 'what would you consider to be good teaching with ICT?' was asked specifically to obtain an understanding of the awareness that the teachers in this study have of ICT in their practice of teaching. The examples of good teaching with ICT ranged from involving the pupils with using the equipment, to no real clear definition. A few comments referred to the pupils being actively involved with ICT in the teaching by involving them in the process so that they are not, '*just being talked at with a sort of electronic screen (...) and then obviously the children need to have some input into what's going on not just have it simply thrown at them but actually be actively using the ICT'* (Interview 1). The following two statements give a clear and pedagogically thoughtful definition of good teaching with ICT.

'I think it's encouraging the children, yes I think it's modelling, primarily it's modelling how to do things but it's giving the children the opportunity to do things for themselves. If you are only ever showing them things and they're not doing it then you're not really helping them because you learn by doing things yourself. So I think good teaching would be giving the children access to it and giving them the opportunity to explore it themselves' (Interview 7).

' When I'll say the children and the teacher are engaged together and the children know what they are doing and they are learning, they are engaged, it could be handling the remote control and you've got the teacher, the teacher is there sort of facilitating the learning helping, sort of guiding letting the children make their own mistakes and learning around it rather than sort of always standing over their shoulder saying do this and you do this and then you do... ' (Interview 9).

These comments demonstrate the interactivity of ICT and show how teaching can be a collaborative process. Other comments refer to the breadth of access that ICT can provide, such as, *'opening up the e-world to them'*, and allowing them, '*to access the curriculum* (...) *in letting children have wider experiences than they can meet than just books'*. These views directly suggest that ICT can be a way to encourage pupils to access learning beyond the classroom. Other teachers view ICT as a teaching tool to be, '*integrated into daily life but used purposefully*', and that it is, *'one of the many tools that teachers will turn to and it's used in the right way for the right thing'*. As such these views imply that teachers who think of ICT in this way do so in a positive manner. Less clear but still positive views were also made regarding good teaching with ICT such as it is, '*used sort of to incorporate and put forward a learning objective or learning point'* and that, '*when it will enhance my teaching and the software available meets my teaching/learning objective'*. One teacher's comments about good teaching with ICT demonstrates the importance of teachers sharing practice so that they can develop their own practice and develop a clear understanding of what teaching with ICT is about, '*I'm not sure I've experienced it. I mean I don't really know because I haven't really seen other people use it'*. A few comments suggested that good teaching with ICT is about teaching ICT as a discrete subject typified by, '*good teaching practice is to have an input with the whole class so you can actually teach skills on the computer'* and:

' Clear demonstration, using the projector, we've got a projector up stairs, um...open-ended questions for the children so you can where there starting points are and um...what they know already. There's no point revisiting something they've already done it needs to be built upon um...good questioning, clear demonstrations. Them actually trying to solve their own problems, so they're actually learning for themselves' (Interview 13).

5.5.8 Good teaching practice with ICT

Having identified what teachers consider to be good teaching with ICT, this section seeks to identify their understanding of good practice. Asking teachers to identify what they perceive to be good teaching practice with ICT provides an insight into their understanding of ICT use in teaching and learning and how it builds on a pedagogical structure. This question raised issues about awareness, appropriateness and uncertainty. The following comment shows an awareness that teaching can be with ICT and through ICT and was the only one to raise the question of effectiveness. The implication being that an attitude of interest indicates a positive attitude to use ICT effectively:

> *'Obviously it's, like it's got to be core to a lesson, if it's ICT that you're teaching but within Literacy or Numeracy or science or PE if it's being used effectively then fine, I think, I mean what is effective?'* (Interview 19).

Some teachers believe that using ICT as a tool to stimulate and enhance learning and understanding, at an appropriate level and with identified outcomes, underpins good teaching practice with ICT. Defining understanding of good teaching practice with ICT as being an experience that involves both teacher and pupil is exemplified by the following comment:

> *'So there has to be this balance and I think good practice is about balancing all the different tools that you can use as a teacher, balancing your time and your interaction with the children and thinking about your outcomes and making sure that those children are learning at the appropriate level for them'* (Interview 2).

The view that ICT should be used in teaching with due consideration regarding its value is questioned in one comment, '*Will it benefit, is there another way of doing it and rather than just saying I'm going to use ICT because it's there it's using it to its ...'*. Continuing on the theme of benefits, another view is that ICT in teaching

should be, '*Well planned, I think it has to be planned and with a purpose and clear objectives'*

The predominant view is that teaching ICT skills is important, as the skills themselves will then be used throughout the curriculum. There is evidence to suggest that there is some ambiguity about what good teaching with ICT is, as the following two comments illustrate:

> *'Really good teaching is the questioning, actually establishing where the children have come from especially if it was a program that was used the year before'* (Interview 13).

> *'Good teaching practice I think would be to plan and teach perhaps once may be twice a week a lesson, a full class lesson teaching and going back over skills and then giving the children opportunities during that week to actually practise those skills you've taught them all'* (Interview 10).

One teacher believes that although ICT can make their teaching better, using ICT is basically a substitute for when, *'you haven't got any other resources and I think the children need a balance. You know they need books, they need posters, they need worksheets, and they need a range of things really'* (Interview 6).

5.5.9 ICT effective use

Teachers were also asked about what they consider to be effective use of ICT, the responses were grouped into the following range of uses. These are given in no particular order and no judgement is made about the appropriateness or value of each use:

- incorporating ICT into a programme of cross-curricular use
- teacher presentation tool (immediacy of ICT)
- electronic encyclopaedia
- to simulate concepts
- pupil presentation tool
- time saving tool for information handling integrated into a lesson.

Comments received regarding these uses included:

> From teachers point -'*Well I think it should be just naturally incorporated into any curriculum area that, you know whenever you can find it useful then use it (Interview15).*

From pupils point -'*whenever it's going to be used to learn something quicker and simpler in a more fun and exciting way then it should be used' (Interview 18)*

and

'...something that's interactive, creative and you know develops the child's thinking really and makes them independent users' (Interview 20)

5.5.10 Examples of activities used

The sample group were asked to provide details about ICT activities they had recently undertaken with their pupils. A snapshot of activities undertaken on the days immediately preceding their interview is shown in Table 13. The answers to this question were used in conjunction with teachers' views regarding good teaching with ICT and good teaching practice with ICT.

Practicing spelling	Make and use graphs from a database
Writing a play	Send e-mail
Scatter graph (daisies)	Interacting with IWB
Compose music	Spellings
Data into graph	Video on IWB
Spreadsheets	Numeracy on IWB
Building a data base	Free choice
Talking book	Web site games or audio tape
Simple word processing	Web site game on IWB
Internet searches	Spellings on IWB
PowerPoint presentation	Counting and number line on IWB
Dictaphones	Spellings on IWB
PowerPoint	CD-ROMS / Internet
Interactive teaching program IWB	Dazzle / play on IWB
Reading a database	Web use

Table 13 Description of use of ICT in teaching

The activities identified showed a comparatively limited range of uses of ICT. Use of the IWB is predominant and the pupil centred use of the ICT is relatively limited. There is a strong indication that IWBs have come close to dominating ICT

in primary education, whether they are being used effectively is questionable, as the following comments suggest, '*the whiteboard I guess we use all the time so I don't plan for that. For me it's a blackboard*':

> *'We use the whiteboards daily, interactive whiteboard and that might be just a word processing tool or sometimes we use it as an overhead projector but there's lots of different programs on there that we implement into our daily lessons' (Interview 13).*

5.5.11 Observation

The purpose of the observations undertaken in this study was to support and enhance the data acquired from the interviews and questionnaires. The lessons observed ranged from teachers using the ICT as a presentation tool (IWB) to pupils using computers and in one case the pupils used a floor turtle. Appendix 16 provides details of the observed lessons.

The adapted Kennewell model, repeated here in Figure 25 shows the affordances and constraints used to obtain indicators of attitude that influence the classroom activity. As part of the observation the affordances identified were:

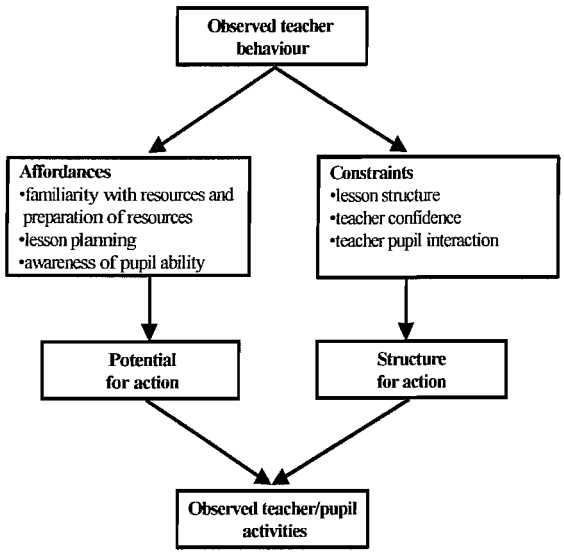

Figure 25 Classroom observation model (adapted from Kennewell, 2001: 108)

- generally teachers' familiarity with the technology supported the needs of the lesson
- the attitude towards the technology was positive indicated by the fact that in all cases the equipment required had been prepared
- the minority of observed lessons had prior written planning. The inference being that the use of ICT is perhaps not seen as an element that needs to be planned in detail
- where pupils were using the ICT (computers) the majority of the teachers were aware of their pupils varying abilities and considered them during the progress of the lesson, however there was no evidence of differentiated tasks

The constraints identified were:

- the lessons were structured within the range of the ICT being used
- findings show that teachers who were technologically au fait tended to control their lessons in a structured manner and indications were that the technology outcomes were more important
- the observed range of work set was mainly within the teacher's level of confidence which may indicate an attitude to operate within a 'safe zone'

The aim of this section is to identify general behaviours which teachers display towards their pupils once they have set an ICT task. The interview responses provided the secondary method for gathering data from teachers regarding their attitudes to how they behave in an ICT teaching/learning situation. Teachers' interactions with and behaviours towards their pupils, during the observed lessons, were recorded and analysed and together with the interview responses support the triangulation process in this study. The lesson observations were undertaken to provide verification of the stated behaviours. Descriptions of behaviours by the teachers themselves cover a range of styles from:

> *'Yeah, I wander round, if they've got any questions they will put their hand up but if I've given them a prompt sheet I will always refer them back to that. It might be that you'll notice that two or three are having trouble so you'll bring them all back together and do another little mini plenary or a demonstration so...but sometimes they will all be getting on and you're not need. Sometimes you're just redundant really but they know that you're there if needed'* (Interview 13).

to where references were made to using software that allows teachers to control the pupils' computers, although they use it for demonstration they still considered it important to move around amongst the class trouble shooting:

> *'If I take a lesson in the ICT suite I quite often use the RM Tutor so I will show them what to do first or how to do it. Then I use that to monitor but being realistic as well quite often I will end up walking around the room and solving all the problems that are occurring. (...) Yes and quite often it's not really well sometimes it's the children's fault because they haven't listened or they have forgotten the instructions but quite often um... it's some problem that's come up because of the software'* (Interview 4).

A number of teachers, especially but not exclusively, those in Key Stage 1 organise their pupils' computer work so that LSAs are supporting the pupils. Some teachers indicated that they use more skilled pupils to help:

> *'So the tendency tends to be to leave them and if there is a problem they put their hand up and ask or I sometimes would then send a more proficient ICT user to help that group if it was a problem with how do I do this as opposed to a curriculum area that they were studying (Interview 8).*

Overall there was no consistent pattern of reported behaviour of the teachers in this sample group. The tone of the comments suggests that there is a positive attitude towards teacher/pupil interaction.

In all instances the observations were consistent with the interview statements of indicated behaviour. The tones of the interactions that were observed were classified as structured (as taken to be part of the planned progression of a lesson), helpful (in the immediate situation) effective (did it solve the issue being raised) and ad hoc (unplanned interaction by the teacher). In all the observed lessons the structured interactions were as expected. Where the pupils were using the computers the interaction between the teacher, pupils and ICT was positive and the teachers were supportive and predominantly proactive. During two of the observations the teachers had to deal with equipment failure, which they both managed to solve. On most occasions teachers were able to resolve the skills related problems that arose regarding the program being used. The ICT confident teachers mainly supported their pupils with their skills needs as opposed to subject needs. Where the teachers were using the ICT (IWBs) no interaction was observed between the pupils and the ICT. Gauging the observed lessons against the sample group of teachers' views about effective use of ICT, only one of the observed lessons could be considered to be innovative or challenging.

5.6 Part of teaching and learning

5.6.1 Do you think ICT has had an affect on your teaching?

Teachers were asked to consider the effect ICT is having or has had on their teaching to elicit feelings about their perceived value of it. Views range from the positive beneficial affects that ICT has had, through to the relatively negative. One teacher's opinion is that it has allowed children to be involved and supports different learning styles and abilities:

> *'I think so because, because it's you know suddenly something different from the chalk and talk, I think you're able to allow the children to become more involved in things and giving their explanations in a different way because they can graphically do it rather than just talking about it. So I think it gives access for different types of learners and different abilities really'* (Interview 7).

Another teacher's view is that the materials now available have encouraged them to use ICT more:

> *'Yes, it has in the sense that I probably make far more use of it than I ever used to because the material that's coming in for us to use now is so much better. I think the publishers have actually got to the point where they've realised what schools need and there is some good quality stuff now and the websites are tremendous for searching and researching and there's an awful lot of material out there now to support teachers'* (Interview 2).

In contrast, at the other extreme, is one teacher's concern that due to the technology, there may be some degree of losing control, as described below:

> *' ...so it's made me feel not as in control of what I should be doing as I like to feel, um... and I know that a lot of children I teach know more of the skills than I do and that's had an affect because it makes me more nervous I guess'* (Interview 8).

In a similar vein another teacher believes that ICT has not particularly affected their teaching, however they state that:

> *'I think I went through a phase where I felt inadequate as a teacher because there were aspects of the curriculum I felt very uncomfortable with which hadn't happened in the past but I don't think it's particularly affected my teaching in the classroom'* (Interview 10).

The view that ICT is an aid to teaching in the sense that it can assist to improve teachers' lesson observation grades, is suggested by the following comment:

'It aids my teaching but I don't think it has affected, or made me a better teacher. Well I've...I enjoy teaching and I love teaching and I've just had a lesson observed and my resources were prepared on the computer but I didn't use it in my lesson and I got a good grade' (Interview 5).

This comment is reflective of the external pressures imposed by the process of perceived performativity.

Once a certain level of perceived and confirmed expertise is arrived at, the effect that ICT may have on teaching is that it may produce a situation where working within a comfort zone evolves, as exemplified by the following comment:

'However some of the software programs that I used I thought fabulous and I felt very comfortable doing them. I soon developed my own little niche of what I knew I could do and used that all the time and to some extent I'm still doing that. I just wish that I could do more' (Interview 11).

Where in many instances ICT is seen as a support for teaching, in a number of ways there is still a lack of appreciation of what it can do and the affect it can have on teaching. One teacher in particular acknowledges that ICT can benefit them, however they do feel that it is not necessarily their first choice as a medium for teaching in some subjects:

'It's probably added another dimension - but if it wasn't on the - something I had to do, I probably wouldn't use it. Even now? I probably would, I would use, I probably would use the Internet and the whiteboard, but I wouldn't necessarily say I'd use it for Literacy and Numeracy' (Interview 12).

Another teacher who identifies the commitment that is required for ICT to have an influence on teaching provides an alternative view to the previous comment:

'Well I've got to take it into account when I'm planning and the actual preparation because I find it takes a lot more preparation than other subjects do in that you've got to know what's on there and you've got to have had a play before hand...' (Interview 9).

The view that the influence of ICT is more about the changes that have occurred in the learning process as opposed to its affect on teaching is held by another teacher,

'I don't know really. Partly you don't teach as much they are learning for themselves or whatever so I don't know it's a difficult question because it has changed it but it's not changed my teaching as such, it's changed the learning'
(Interview 13).

5.7 Management of teaching and learning

Essential elements of a teacher's professional role are to plan, organise, record and report; increasingly this is being carried out electronically. The teachers in this study can in the main see positive benefits from using ICT for management purposes, principally as a time saving tool and by implication reducing the amount of personal time spent on administrative tasks related to teaching. One teacher acknowledges this but at the same time refers to the ever-evolving nature of teaching:

> *'But of course, year on year on year things have changed so that's it's not um...the planning that we did a year ago isn't valid for what we want to do now. To a certain extent things like being able to scan in documents and cut and paste things from there has certainly speeded up the amount of time that I, you know the amount of time a task would take has certainly got shorter'* (Interview 3).

These above mentioned elements could be described as core operations for teachers, with the Internet making available material for practical classroom use. A number of ways of using ICT to support teaching were mentioned including preparing more in advance and using visual resources, finding out curriculum information, researching lesson ideas and finding new games to play to accompany pupils' lesson objectives. The following comment summarises the benefits that ICT can provide:

> *'I'm using it to plan, I'm using it to deliver and I'm using it to assess. So I'm using it at all stages. I'm using it to actually get information I don't tend to use lesson plans that are on line but I do tend to use obviously information that's on there. I adapt it to suit myself, do my own lesson from it I then use ICT to actually prepare those lessons. I will use it if I'm using resources in the classroom'* (Interview 14).

The teachers in this group were asked, in the questionnaire, to identify how they use ICT to support their teaching. The reported results in descending order of stated use are:

- preparation of teaching materials
- report writing
- access to professional development materials
- record keeping

- access to reports and responses to inspection findings
- access to reports and responses to classroom focused research
- access to professional discussions

5.8 Summary

In this chapter the findings from the encoded data have been presented, analysed and interpreted within the research framework elements.

These findings have revealed that teachers think about ICT in three ways. They see it as a functional tool for themselves, a means of preparing children for the future and in some cases a challenge to their role. Professional development is seen as an ongoing process. However a significant number of comments have been directed at inappropriate NOF training.

Teachers' evaluation of their present practice is more to do with their skills ability rather than pedagogic ability of how to use ICT. Sharing practice is seen as a significant and positive experience but one that does not always occur in a planned setting. ICT familiarisation is not considered to have a high priority for teachers' time.

The findings indicate that teachers' understanding of the integration of ICT into the curriculum is centred on teaching rather than pupils' learning. However the value of ICT for pupils is seen as a means to stimulate learning and develop independent learners. A significant number of teachers believe that ICT skills need to be taught. A view linked to the idea of preparing children for the future.

Evidence suggests that teachers view the use of ICT as a joint experience between teacher and pupil. The incorporation of ICT into a pedagogic structure reveals concerns about awareness, appropriateness and uncertainty. Examples of ICT usage correspond closely to McCormick and Scrimhaw's (2001: 51) categorisations of ICT as an efficiency aid and as an extension device with regard to educational goals and purposes. Observed lessons in a number of cases were not supported with written planning. Teachers' technical competence and an inclination to work

within 'a safe zone' had a significance influence on their goals and outcomes for the lesson.

Overall the findings indicate that the research question was a valid one to address. These findings have provided a rich source of information regarding teachers' attitudes towards ICT. In addition, they have shed light on the thoughts and feelings that contribute towards an understanding of the multi-concepts of attitude. The next chapter presents an overview, discussion of the findings and answers the research question

Chapter 6 Overview, discussion and conclusions

6.1 Introduction

This chapter begins with a short overview of the study followed by a discussion of the findings. The research question has been answered by the identification of a number of significant elements of attitude. A new model for teachers' CPD with ICT has evolved and is based on the five multi-concepts of attitude and is a key contribution from this study. This research has also lead to the identification of five key issues, which I consider to be topics for future research. During the process of this study, an idea based on the identification of effective pedagogy has evolved. This lead to the development of an original pedagogic model for ICT in teaching and learning.

6.2 Overview of the study

The literature review began by examining the relevance of the research topic and then considered the influence ICT has on teaching. The changing dynamics that affect teachers' use of ICT in teaching and learning were identified and discussed. The position of ICT and government plans for its future was presented in conjunction with a short assessment of the political aspect of ICT in education.

The literature has provided a picture of teachers' pedagogy and practice. Significant factors that influence these include:

- the changing role of the teacher
- the creation of learning environments to facilitate active learning
- the changing of teaching approaches from teacher centre to pupil centred
- the lack of curriculum guidance for integrating ICT
- the preparedness to engage in practical and theoretical work of determining wise and appropriate use
- the consideration of both the internal and external community

From the literature review ICT pedagogic practice was categorised as taking place in two settings: the pedagogic arena, defined as the broad context in which learning activities take place and the pedagogic setting where the actual practice of teaching

and learning is realised. Teachers' professional knowledge is underpinned by a personal construct, which draws on the interrelationship of subject knowledge, school knowledge and pedagogic knowledge. Aspects of effective pedagogy were identified and presented within the pedagogic arena and setting. The literature review identified a number of factors that influence teachers' attitudes to ICT use in teaching and learning. These are situated around their thinking and beliefs and their pedagogic reasoning and practice.

The concepts of attitude, which are a key feature of the research question explored in this study, were evolved from models used in both social psychology and studies of computer usage behaviour.

The methodological approach taken was that of a multi-method qualitative design using interview, observation and questionnaire to fulfil the requirements of triangulation. Using triangulation brought internal validity to the data collecting and credibility to the results of research. The empirical data were collected with due regard to and within the bounds of an ethical statement. The data have been electronically coded and the findings presented and analysed to identify the multi-conceptual elements of attitude as represented in Figure 26.

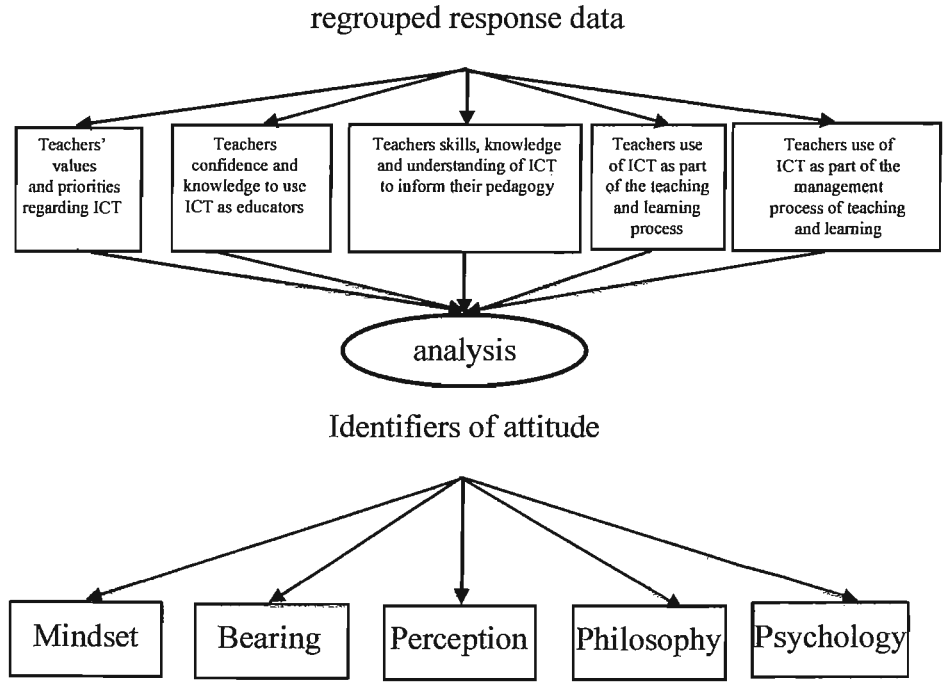

Figure 26 Transformation of data to attitude

The methodology for this study is rigorous and reliable and can therefore be applied to other qualitative studies thus providing an insight, on a wider scale, into the attitudes of other teachers.

The interpretation of the analysed data has identified how ICT imposes on teachers' attitudes, their thinking about it, the influence it has on them, their awareness of it and their behaviour as ICT users.

6.3 Discussion of the findings

Teachers' feelings about ICT outside its use in education is, in general, upbeat with words like *'happy', 'excited', 'best thing that's ever happened', 'really important', 'fantastic'* and *'yeah I love it'* being used. Moving from the general to the specificity of ICT in education, the way the teachers in this group think about it covers a wider perspective, however most see that it has a value and as one teacher commented, *'I like ICT I think it's useful for me, it's useful for the children, it's part of the world that we live in'*. The feeling of another teacher is that, *'ICT has made a tremendous difference to the curriculum and the challenges that we can provide for children'*. However a small number of responses indicate that there is an element of ambivalence about the acceptance of ICT with opinions ranging from concern about the relative value of the teacher compared to ICT through to concerns about the necessity of it having to be the core of every lesson. If teachers think about ICT in this way they may be less accepting of the possibilities it can offer, making them reluctant adopters of ICT related initiatives. All the teachers in this group believe that ICT has benefits but at the same time have concerns about some aspects of it as it applies to them.

A small number of teachers expressed concerns about their lack of confidence and familiarity with the technology. Suggestions were made that LSAs or specialist ICT teachers could be used to deliver the ICT component of the curriculum. One teacher articulated similar views to Hammond (2002: 4) regarding the point that teachers do not always understand the intentions of the innovations:

> *'...that for the teachers to gain confidence, the first thing they have to do is to see a benefit to them. Once they can see a benefit to them they can then pass on that benefit to the children'* (Interview 3).

This attitude is also reflected in a response from another teacher who felt that they were moving towards this position, *'Sometimes, I think it varies. I think I'm becoming more and more computer reliant... if it makes it (teaching) easier it's got to be a good thing I think'.*

When asked in the questionnaire to respond to the statement 'Serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum.' How has this affected you and what are your views about this statement?'. The responses varied from, *'ICT is the future and should be an integral part of the curriculum'* to *'Teachers without a reasonable degree of skills or who are unwilling to embrace change are doing a disservice to their pupils!'* Some responses referred to teachers' own use, *'confident and competent user but not in daily lessons'* and *'Confident about using ICT in own classroom i.e. IWB concerned about using suite because others use it, worry about using equipment that is used communally because of reliability issue'.* A number of responses alluded to the ICT experience as being challenging and requiring a steep learning curve, *'we should feel confident and competent to teach using ICT. I have had to learn a lot and its been a steep learning curve for me'.* Some comments were made about equipment reliability, *'I feel confident and competent - as long as the hardware doesn't let me down! Can be very frustrating and time consuming.'* Concerns were expressed about needing, *'more training and assistance'* and *'teachers should be able to use ICT but should get sympathetic help if needed'.* One teacher responded with complete confidence, *'I agree with this statement and feel I have relevant training to teach and use ICT'.*

Many concerns about money issues were raised in both the interview and questionnaire, indicating the strength of this concern. Feelings of concern were expressed about the amount of money being spent on ICT resources to the detriment of other subjects. The feeling that the provision of ICT resources as being of higher relative cost than those of other subjects gives rise to the view that

funding could be channelled elsewhere for example, to purchase books. There is a perception that ICT is in competition for resources with other subjects rather than being seen as a means of supporting them. The expectation of future innovations is a concern to some, in particular for the need for present and future training. Others feel that they, *'can't deliver as much as we would like how and when we would like'* due to lack of ICT resources. The lack of resources is developing into what I call 'ICT envy'. One teacher perceived that not having an IWB has caused them to lag behind other members of staff and has not helped them *'in that front'* which influences their decisions about how to use ICT in their lessons. The issue of lack of access to resources appears to hinge on the need for access to more equipment in the form of more IWBs and laptops for teachers and computers in the schools. The issue of hardware acquisition to keep up to date continues to be a feature of ICT in primary education. These views in the main replicate the barriers to the use of ICT, identified in the BECTA survey of 2003, which indicated that the three principal elements were a lack of access to quality resources, a lack of time to prepare resources and technical problems. A number of respondents in this study mentioned reliability of equipment as an element that affects their confidence to use ICT as planned.

A number of perceived pressures both external and self-imposed were identified which might possibly induce influences on teachers' behaviours. A significant number of teachers believed that their pupils had a greater level of knowledge and ability with ICT than themselves. Do teachers believe that children are skilled ICT users? If they do, what skills do they perceive they have? Is it 'joy riding' of the Internet, games playing or something related to the work of education? Until teachers ask themselves these questions, this perception of inadequacy compared to their pupils is likely to continue. There is no doubt that in some cases pupils may be more technically skilful, however it is the teacher who has the pedagogical knowledge to direct these skills for educational purposes. Teachers need to understand why and where and when and most importantly how children learn with ICT. The issue is about learning 'thinking and learning skills' not functional skills. Teachers have the pedagogical knowledge to provide learning experiences where

pupils can learn to 'think and link'. Teachers need to guide and develop pupils' thinking within the classroom, which should permeate through to ICT use at home. How can the view expressed in the comment below become more widespread?

> *'A lot of them have access at home and it's nice that we can maybe give them something that they haven't seen before that they can then do at home, they can carry on at home but I think not everyone has that opportunity'* (Interview 7).

Methods of assessment can generate feelings of uncertainty and insecurity, especially where the measurement criteria are not apparent. Other issues impose their own pressures including feelings of guilt about wanting a work/life balance. External pressures may be addressed and managed by the schools, however the self-imposed pressures are more serious as they are not tangible and also less manageable. They are indicators of a person's mindset and can therefore influence their attitudes.

Teachers' confidence and knowledge to use ICT in teaching and learning is influenced by their views and judgements about it. Views change as time progresses and in this study teachers identified changes in their views about pedagogy and developing acceptance of ICT, however some focussed only on the changing technology. An indicator of confidence is about making judgements about oneself in a given situation, namely ICT. Teachers rated themselves as fair to very good as practitioners. Making judgements such as these however, raises the issue about what are these judgements based on. If teachers do not see innovative and good practice where ICT is being used, in both teaching and learning, they may not be able to make informed judgements about what they can use it for and how they can raise their standards of use. Admiring colleagues' expertise at using ICT or seeing what colleagues can do with IWBs may be evaluated with insufficient knowledge of what is good practice. In these cases their judgements may be against what they perceive to be good practice with ICT from a narrow band of experience. A few comments indicated that opportunities to work with 'experts' would be of value as well as being able to share pedagogy, knowledge and resources. The perception about sharing knowledge, skills and understanding is seen as beneficial and a positive experience, however the findings suggest that

there are limited opportunities for sharing these and practice, whether within or between schools.

Teachers' awareness of their responsibilities towards meeting the requirements of the National Curriculum is indicated by their attitudes towards the integration of ICT into the curriculum. Indicators show uncertainty about the best way to use ICT as required by the National Curriculum and these uncertainties support the views held by Leach and Moon (2000: 389) regarding lack of statutory curriculum guidance. The majority of attitudes indicate that the use of ICT is directed more towards providing a foundation to the teaching process than to be a learning medium for the pupils.

The view of ICT as an active assistant in both teaching and learning is held by a number of teachers, however there is uncertainty as to the precise pedagogical support that ICT can bring. Views of ICT as an enabler were almost equally divided between its capabilities in the teaching process and in the learning process. An entertaining and telling remark was made:

> *'I think it's absolutely essential in this all singing all dancing world that these children are used to video images everywhere and your ordinary teacher with a few coloured pens isn't good enough anymore. You've got to have something to attract their attention'* (Interview 1)

The last point corresponds to views expressed by others where they view the ability of ICT to present the world in vivid and 'virtual' reality. That functional ICT skills should be taught is prevalent, this is borne out in both the questionnaires and interviews. The feeling is that skills need to be taught so that pupils may then be able to utilise ICT for further and future learning and also for the world of work. In assessing the value of ICT for pupils and therefore indirectly for teachers two main themes emerge. First that the perceived value is based on skills development for future use and benefit and second that ICT has an ability to facilitate learning in ways not previously possible.

There were no negative views expressed regarding the potential of ICT in the learning process, rather it was seen that it could support development of independent learners, different learning styles and provide a stimulus for learning

as a motivational tool. Some teachers felt that ICT suits some subjects better than others and that the value of other media for learning should not be dismissed. There is little evidence to suggest that the teachers in this sample group have a consistent understanding of collaborative learning and sharing which may impede the development of effective collaborative learning situations.

Kennewell (2003) suggests that there needs to be a measurement of the gains that ICT provides over other means of teaching. This study is not aimed at evaluating the level of change or gains, however comments indicate that teachers feel that there has been a positive change in their pupils' learning. If teachers can see how ICT benefits their pupils' learning they are more than likely to have a positive attitude towards it

A number of comments regarding the perceived amount of time given to professional development suggest that the need for more time to be made available is a major consideration in learning the technology and becoming more proficient in its use and implementation. A point made for the need for continued and better training for teachers to keep up to date with technology raises issues about whether this need is for skills development or pedagogical understanding of how to use the technology. A salient point raised is that of the importance for teachers to be given adequate time and funding to undertake training and that they need to actually understand what they are using and by implication how best to use it in teaching and learning.

In general, comments have been directed at the NOF training as it is the most recent and high profile. In this study the majority of these comments were negative with the resulting potential of reducing the perceived value of ICT and consequently generating a less than favourable attitude towards the technology. If teachers were 'signed off' without satisfactorily completing the NOF training, issues are raised about the need for stricter controls to be in place for future training. Government plans for the development of ICT in schools up to 2006 and beyond will focus attention on, 'the need for sharper focus on the science of teaching around ICT' (DfES, 2003b: 4). The technology has moved on even from

the NOF training period; now that IWBs are in schools perhaps a new injection of money may be needed for teachers to use them and other new pieces of equipment most effectively.

Awareness of ICT in teaching is seen primarily as a function of ICT as a tool to support pupils across a wide area of contexts of learning. Pedagogical definitions given of good teaching with ICT suggest it is about teacher and pupils working together. There is no clear evidence to suggest a consistent understanding of good teaching practice with ICT. The pedagogical understanding is centred on the development of skills. It would appear that ICT is primarily seen as a tool to support existing practice as opposed to considering the potential of the tool, which may be more wide ranging than is currently used. Effective uses of ICT identified by the teachers in this study closely corresponded to the activities of their existing practice. What the teachers in this study believe to be effective use of ICT closely corresponds to what they currently do and were observed to do. The inference from what they do is that the use of ICT, from the point of view of using it to support their teaching activities, is regarded as a positive development for themselves and by extension their pupils. In this study the findings show that the position of the teachers, regarding good teaching with ICT, is pupil-centred; good teaching practice with ICT is about what the teacher has to do to bring about the teaching/learning situation.

In this study the observations indicate that the teachers in this sample group work within their technical capabilities and within a 'safe zone' indicating a disinclination to take risks or experiment with the use of ICT. They have a positive approach to the technology regarding its preparation and familiarity for use within their lesson, however written planning for its use is somewhat lacking. In general the majority of the teachers are focussed on supporting and developing their pupils' skills and the teachers who were technologically au fait put the technology first. These behaviours suggest that ICT has a value in teaching, however there are suggestions of insecurity, which may mitigate against positive attitudes towards it.

One of the Expected Outcomes for teachers from the NOF and NQT training is that teachers should, '...know how ICT can be used when planning, including the use of ICT for lesson preparation and the choice and organisation of ICT resources' (TTA, 1998: 3). All the teachers in this sample group said they use ICT for preparation of teaching materials and report writing. One aspect that received positive comments was the availability on the Internet of planning information and resources, though this latter came with a caveat from some teachers about need for time to refer to the available resources. The perceived benefits of the immediacy of ICT both as a resource tool for the management of teaching and learning and the development of teachers' own knowledge strongly suggest that ICT use for the management of teaching and learning has been a success. The benefits of ICT have been more widely seen in this area than any other with almost all positive views being given.

Outside these core elements, teachers are able to enhance their portfolio of expertise by accessing information on the Internet; by doing so they can extend their professional knowledge beyond their own immediate environment. The frequency of use indicated by teachers suggests that the value placed on classroom focussed research and professional discussions indicate that they are not considered to be a means of professional development.

6.4 Conclusions

The research presented in this study sought to identify teachers' attitudes to ICT in teaching and learning within a multi-conceptual definition of attitude. An underlying objective of this study has been to aid in the understanding of teachers' use of ICT in teaching and learning in primary education.

6.4.1 The research question answered

The aim of this research has been to answer the principal question:

> ***What attitudes do teachers have to ICT in teaching and learning in primary education and what factors underlie them?***

This research has proved that teachers do have a range of attitudes towards ICT in teaching and learning and equally they can be attributed to the five multi-concepts of attitude namely *mindset, bearing, perception, philosophy* and *psychology*. The

data have revealed a number of noteworthy attitudes, which are discussed in detail below.

Mindset - how personal/political/social issues impose on teachers' attitudes to ICT

- ***attitude towards ICT in general is more positive than it is to ICT in the practice of teaching and learning***

The indication here is that ICT may have a higher value, be easier to use or be more comfortable within personal usage than in professional use. Identifying where a teacher is positioned with regard to their personal mindset can inform either their approach to ICT use within the classroom and/or their specific ICT professional development needs.

- ***ICT is sometimes seen as a comparatively expensive resource, and as such may be in competition with other subjects for resources rather than being seen as a support to them***

The implication of this finding is that where teachers do not feel positively about the abilities of ICT to be a resource, it can be seen as a threat to their existing resources. The issue here is to address this mindset by informing and positively developing the relationship between the benefits of ICT and the teacher's needs.

- ***negativity with regard to training***

Allocating training without an awareness of a teacher's mindset towards ICT can result in a subsequent negative attitude to the training received. The NOF training experienced by the teachers in this study has not provided a universally perceived benefit; indeed some responses have indicated a significant degree of negativity. Targeted training, identified with regard to specific attitudes and abilities can at least obviate the negative reactions found in this study.

Bearing - the influence ICT has on teachers

- ***pupils' greater level of knowledge and ability with ICT***

Not acknowledging their own pedagogical expertise leads some teachers to believe that their pupils have a greater level of knowledge and ability with ICT. The indication here is of confusion between functional ICT skills and knowledge and ability to apply ICT to learning. To place this expectation into its correct context

teachers' pedagogic expertise needs to be emphasised and developed with regard to ICT.

- ***methods of assessment can generate feelings of uncertainty and insecurity***

The feelings of uncertainty and insecurity can influence teachers' attitudes towards their use of ICT in teaching and learning. These feelings can affect their ability to perform to a number of assessment criteria and are possible indicators of their own expectations and capabilities. Clarity regarding assessment criteria at any level may alleviate uncertainty about that assessment.

- ***uncertainty regarding future developments***

ICT in education has continually evolved in parallel with the technology and change is guaranteed, whether it is embraced by educators or not (Gibson, 2001). The issue here is that of teachers' feelings of uncertainty regarding the next developments of ICT in education and how they are expected to respond to them. The view is that as soon as familiarity and confidence is established with one development there is another around the corner. Developments need to be explained in terms of what they are expected to achieve and how they might best be utilised.

- ***continuing need for funding and training***

Teachers see ICT as an area that needs continuing funding to keep up to date with equipment, both hardware and software. However up to date equipment does not guarantee effective use of ICT in teaching and learning. Loveless et al. (2001) note that technology does not change practice however people do. The indication is that teachers see that each piece of technology requires their training for its use. The emphasis needs to be on fitting the technology into their pedagogy and allowing the teacher to affect the result.

Perception - teachers' awareness about ICT

- ***not being aware of others' practice with ICT***

Opportunities to share practice with colleagues was seen to be a positive experience, however the opportunities to do so happen on a random and unplanned basis. There is awareness that observing or sharing practice is seen as valuable however there is little evidence to indicate that this occurs regularly. There is a

perceived lack of time to enable either formal or informal opportunities to view each other's practice. For teachers the act of observing colleagues teaching can be an informative and beneficial activity that can bring new perspectives to using ICT in teaching and learning.

- ***value of ICT in supporting teachers in their practice***

Teachers in this study acknowledge that ICT can support them in their practice, however attitudes towards it continue to be those of computer awareness and computer literacy. These views appear to be substantially unchanged since Drennoyianni and Selwood's findings in 1998 despite the NOF training, which has occurred in the interim. The issue here is to identify types of training that can assist teachers in developing their use of ICT as a resource within constructivist, collaborative situations.

- ***professional growth and development is part of teaching with regard to ICT***

Although this is a positive attitude this research indicates that teachers themselves see functional skills training and development as a key to using ICT effectively. The way forward is to capitalise on this positive attitude using it to extend and expand the pedagogic understanding and use of the technology.

- ***the value of ICT is perceived by how it can support and what it can offer pupils in their learning***

Again there is a positive attitude towards the belief in the value of ICT and the contribution it can make to pupils' collaborative learning. ICT is also widely viewed however as a tool that requires functional skills development. The implication of this is that teachers should be encouraged to emphasise the collaborative aspects of the technology.

Philosophy - teachers' thinking regarding ICT

- ***a lack of comprehensive technical ability can lead to discounting of pedagogic knowledge which can lead to insecurities***

Some teachers feel insecure about their own technical ability and consequently undervalue their pedagogic knowledge. A way forward for the teachers who hold these views is to have their present pedagogic knowledge recognised as a foundation on which to build an effective ICT pedagogy.

- ***use of ICT is directed more towards providing a foundation to the teaching process than to be a learning medium for the pupils***

This way of thinking is related to teachers' use of ICT, which is predominantly as a tool for teaching with. The implication here is that the outlook is of being the 'sage on the stage' rather than the 'guide on the side' (Gibson, 2001). There is awareness that ICT in teaching and learning benefits from a collaborative approach, however the means to do so is not fully understood.

- ***good teaching with ICT***

This issue is concerned with what teachers do in their practice of teaching. There is evidence to show understanding that pupils should be active collaborators, however the act of collaboration is not yet sufficiently mature to match the interactivity offered by the technology. Developing an understanding of what the technology can offer as a medium for interactivity and collaboration can change the way teachers think about pupils' involvement.

- ***good teaching practice with ICT***

The issue here concerns teachers' understanding of ICT use in teaching and learning and how it builds on a pedagogic structure. It is about what the teacher has to do to bring about the teaching/learning situation by questioning their use of ICT in terms of the objectives and outcomes intended.

Psychology - how teachers behave as ICT users

- ***behaviours regarding specific technology (IWB)***

A number of references were made to IWBs suggesting that they are considered to be the 'technology of the moment'. Effectiveness as a teacher and knowing how to use IWBs effectively were seen as closely related. What is less clear is whether being able to use an IWB effectively includes the fulfilment of the intended objectives and outcomes of a lesson. Moving beyond the behaviour of using IWBs as electronic blackboards requires an understanding of the potential of the technology to create and exploit wider teaching environments.

- ***ICT accepted as tool for self in management of teaching and learning***

The use of ICT for the organisation and management of teaching and learning has been well accepted. This can only be a positive development and could be built on to enhance teachers' classroom use of ICT.

- ***order of use of ICT: (1) tool for teaching with, (2) teaching as a subject (3) tool for teaching through***

The first two types of use point to the functional use of ICT whereas the third is more indicative of collaboration between the teacher, the pupil and ICT. The order of frequency of behaviour towards ICT use is a possible indicator of a level of confidence and competence.

- ***planning for ICT use seen as optional***

This is a significant issue insofar as the minority of observed lessons had prior written planning. This is a further indication of the preferred order of use of ICT where, as a 'teaching tool', it does not necessarily require planning for its use.

- ***work within 'safe zone'***

A comparatively limited range of ICT use was observed in this study which may be a possible indicator of confidence levels as well as a reluctance to move out of working within a 'safe zone'. The view held by McFarlane (2001) that risk taking is not encouraged may be a contributory factor in this area.

- ***pupil /teacher interaction with ICT is valued***

The observation process revealed that pupil/teacher interaction with ICT is valued however the type of interaction is more concerned with ICT skills rather than subject needs. This behaviour may be explained by lack of consistent planning in which clear lesson objectives and supporting ICT use are identified.

- ***the communication element of information and communication technology is rarely used***

Evidence from the ICT activities, identified by the teachers, shows a lack of use of the communications element of ICT, with only one mention being made of e-mail. The issue here is about what and how communication technologies can make ICT a more active and wide-ranging resource.

The value of this research is that it has identified teachers' attitudes and through this it has provided a new perspective on how teachers' CPD in ICT use in teaching and learning can be developed. A key contribution is the development of a new model for CPD, which is described in the next section.

6.4.2 A new perspective

As identified in the Introduction chapter the adapted TAM, repeated in Figure 27, is viewed as being linear in nature and indicates where the five elements of attitude are placed relative to each other. It illustrates how an individual's position with regard to mindset and/or bearing leads to their perception and subsequently philosophy and psychology towards the attitudinal object, which is ICT. The potential of this linear approach is that it represents a different way of developing teachers' CPD in ICT. This approach is aligned with Scrimshaw's (2004) view that:

> The personal characteristics of teachers may also be an important influence on the extent to which they take up an innovation, such as the implementation of ICT. This may result in the need for different approaches to ICT implementation for different teachers (ibid.: 4).

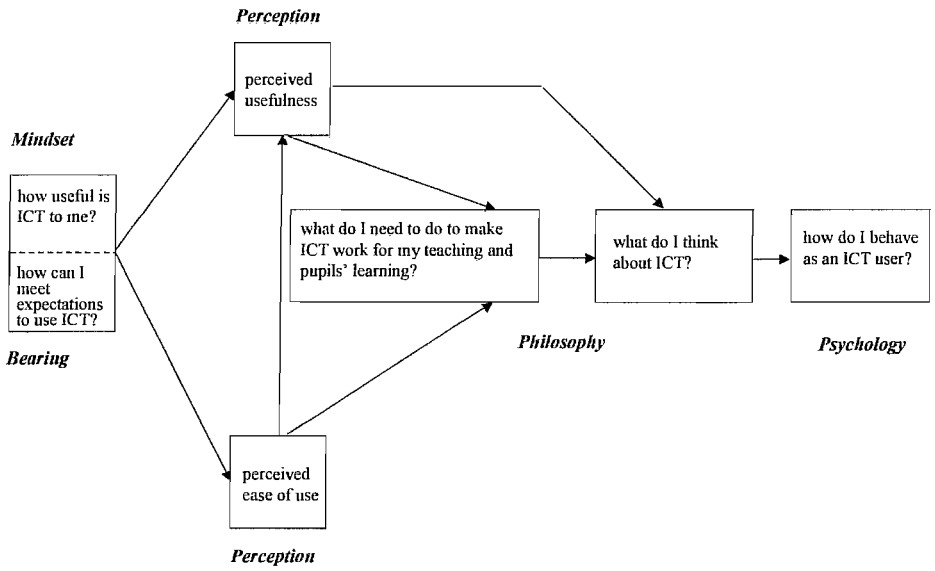

Figure 27 Adapted technology acceptance model (TAM)

Taking each multi-concept together with its key question forms the basis of the CPD model shown in Figure 28. The value and potential of this model for use in CPD is that it provides a structure to work within for gathering information that can be used to reveal a teacher's disposition to respond favourably or unfavourably to ICT or their interpretation of the value of ICT.

6.4.3 CPD model in practice

In the model, the elements of attitude are presented in two layers. The top layer is effectively core beliefs and feelings that if identified and positively developed can influence the lower layer, *philosophy* and *psychology,* towards the attitudinal object. The establishment of such a position can indicate beliefs, feelings and behavioural intentions.

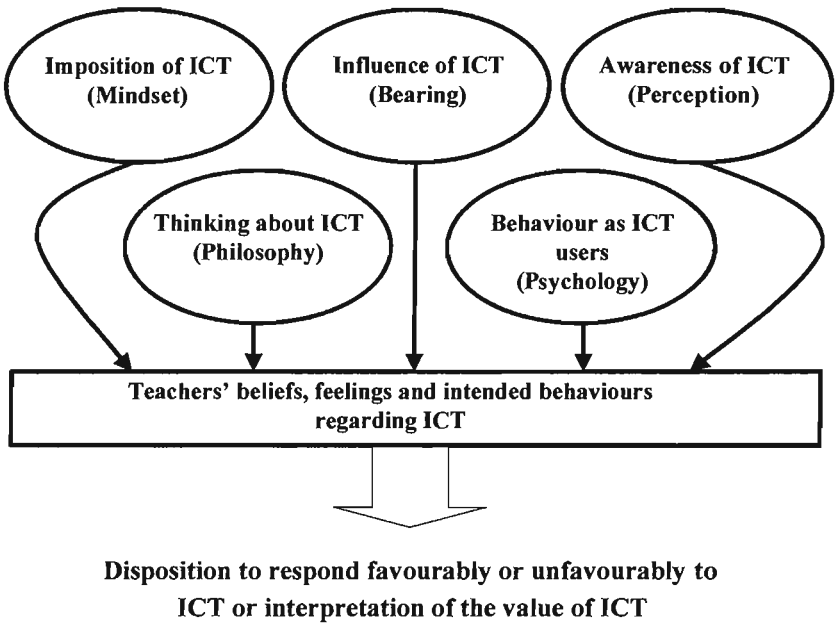

Figure 28 CPD model disposition to or interpretation of ICT

To operate the CPD model questions can be developed to obtain information relevant to each multi-concept within the adapted TAM (Figure 27), the key focus being:

- how useful is ICT to me?
- how can I meet expectations to use ICT?

- what do I need to do to make ICT work for my teaching and pupils' learning?
- what do I think about ICT?
- how do I behave as an ICT user?

The key questions relating to each component of the adapted TAM form the basis for discussion relating to identification of positions regarding the multi-conceptual elements. Questions can be asked to determine a position with regard to each of the concepts of attitude. Having established where an individual is situated with regard to *mindset, bearing, perception, philosophy and psychology* their relative strengths and weaknesses within each multi-concept of attitude can be targeted as an area for CPD.

6.4.4 Future research

I acknowledge that this study has been conducted with a small sample group, however I am confident that they represent a cross section of teachers in primary schools today. To validate my findings the study needs to be undertaken with other groups of teachers to establish if the findings are transferable and if they are, generalisations may be made.

This research has raised a number of issues that when investigated, may further add to the understanding of teaching and learning with ICT in primary education. These are:

teachers' sharing practice and judgement of their own ICT practice

Sharing practice only within ones own environment can restrict development and limit 'cross-pollination' of ideas and practice. The key question here is: what measures do teachers use to judge their ICT practice against and what opportunities for this are provided?

teacher/pupil interaction with ICT

The observations showed that teachers do interact with their pupils when ICT is being used, as they do in any teaching situation. The point of interest here however is how much of the interaction is to do with ICT skills development as

opposed to subject objectives and outcomes. The key question here is: what is the quality and content of the teacher/pupil interaction?

ICT planning for use

Evidence from the observations indicated that planning for ICT use is not undertaken consistently. The key question here is: if ICT use is not planned for, how are teachers aware of their lesson objectives and outcomes?

pupils' perceived greater level of knowledge and skills

This particular external pressure may have a significant affect on teachers' confidence with ICT use in teaching and learning. Teachers need to be aware that they have the pedagogic background and can actually lead in the pursuit of knowledge and its application via its use with ICT. Granger et al. (2002: 487) suggest that teachers need to have some knowledge of what their catchment community perceive, '...as the work of education and community perceptions of what work ought to be'. The key question is: how aware are teachers of their pupils' ICT activities outside school?

developing a 'learning' pedagogy for ICT

The issue here is about how teachers use their pedagogic knowledge to provide learning environments that support the development of 'thinking and learning skills' not just the development of functional skills. Teachers need to guide and develop their pupils' thinking and linking of learning skills. They need to have 'visions of possibility' (Richards, 2006) to proactively integrate and implement ICT. The key question here is: how are teachers developing their pupils' thinking and linking' skills?

These questions will form the basis of further research with the intention of identifying areas for teachers' CPD and to add to the body of knowledge about ICT use in primary teaching and learning.

A further result of this study has been the development of a new pedagogic model, shown in Figure 29, evolved to support the development of pedagogic practice with ICT. The research revealed a variation in teachers' understanding of good teaching. These ranged between using ICT as a tool to enhance their teaching to

using the interactivity of ICT to create a collaborative learning process. Good teaching practice with ICT was deemed to be where it can stimulate and enhance learning and understanding in an experience that involves both teacher and pupil. The aim of the model is to demonstrate that ICT in the teaching and learning process can be separated into discrete components that combine to form a pedagogical structure. The model demonstrates that teaching and learning with ICT can be considered to consist of three distinct layers.

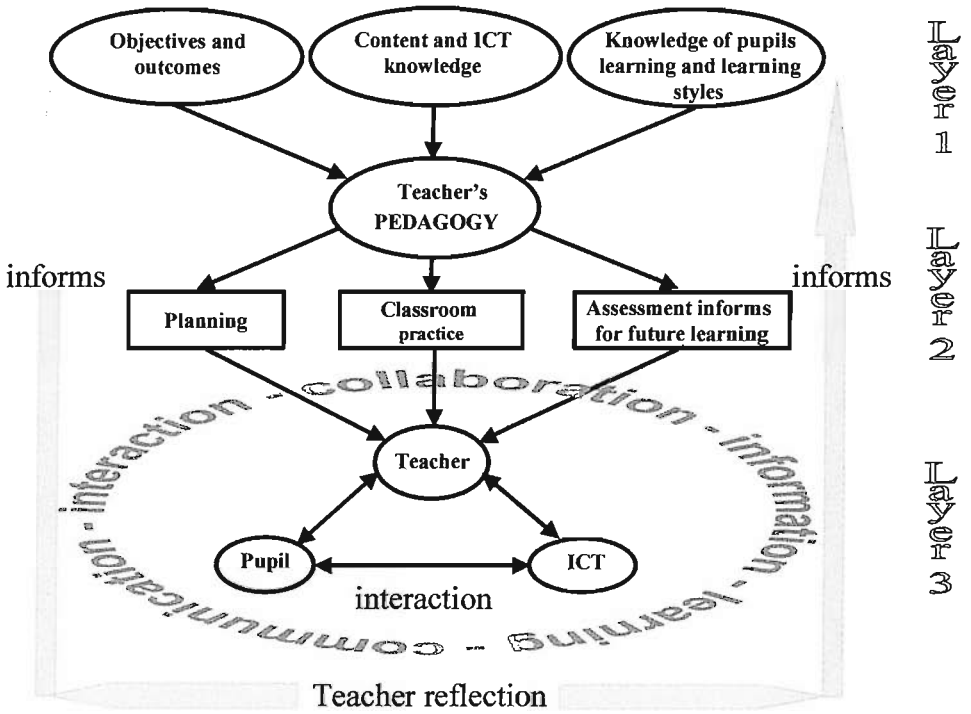

Figure 29 A new pedagogic model

Layer 1 - 'teacher thinking'. At this level the teacher needs to identify:

- the objectives and outcomes for the lesson
- their subject knowledge and ICT knowledge, skills and understanding needed for the lesson
- the knowledge, skills and understanding their pupils have already for (a) the subject and (b) for the ICT required
- pupils' styles of learning and characteristics

Layer 2 - 'teacher action'. At this level the teacher responds to Level 1 by:

- planning and preparing for the lesson
- identifying their classroom practice (activities)
- identifying assessment opportunities for the outcomes of the lesson as well as pupils' future learning

Layer 3 - 'pupil-teacher-ICT interaction'. At this level the whole class action:

- occurs where the teacher has constructed situations for collaborative working, enquiry and decision making
- takes place within a learning environment where ICT may function as a facilitator of active learning and higher order thinking skills
- is undertaken in a social, interactive context involving the teacher, the pupils and the ICT in a collaborative environment
- provides a source for teacher reflection which can inform future Layer 1 activities

All the elements of the model interact with one another providing a structure within which teachers can work. It is intended that this model would be most appropriately applied to individual lessons or short term planning as it provides a step-by-step guide for teachers to navigate through, thus enabling them to develop their ICT pedagogic practice. The operation and applicability of this model needs to be investigated.

6.5 Originality

The real value of this research is represented by its depth and extensiveness in investigating an area of potential. The lack of literature regarding teachers' attitudes to ICT and the topicality of the issues surrounding ICT in primary education suggest that this research is both original and timely. It contributes to the continuing discussion about ICT in primary education by presenting a comprehensive investigation of teachers' attitudes towards ICT in teaching and learning. A significant strength of this study is the development of a different perspective on the approach to the CPD of teachers in ICT.

6.6 Limitation in the thesis

This section identifies the limitations of the study that were noted during the process of the work. The size of the sample group meant that generalisations about the findings could not be made, however that was not the aim of the study. Mertens (1998) suggests that, 'If the findings from one study are observed in another situation, the results are said to be generalizable (sic) or externally valid (ibid.: 67). The aim of this study was to develop propositions that could then be identified in other studies using the same methodological design. The small number of observations could have affected the results insofar as the triangulation was not a one-to-one relationship between interview, observation and questionnaire. The disinclination to be observed may have been due to teachers being continually subjected to measures of performativity. As the sole researcher the potential of subjectivity during the observation process was considered, however the systematic process design enhanced the reliability of the outcomes. Limitations imposed by access to participants and time factors made it impossible to undertake a second round of interviews to discuss further points that arose during the data handling process. It should be noted that in being ethically sound with the data the truth and accuracy of this research has been underpinned.

6.7 Final thoughts

This has been an interesting and fulfilling piece of research and addresses a personal interest. The findings have answered a number of questions that have been raised in my own mind over a number of years about teachers' attitudes to ICT in teaching and learning. It has deepened my understanding of why ICT is still not being successfully integrated into primary education. In addition to providing a different perspective to teachers' CPD this research will make a contribution to further the understanding of how primary teachers respond to ICT in teaching and learning.

The findings from this research will be initially distributed to the teachers who took part in it. This valuable research will be disseminated further through journal articles.

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Appendix 1
Trilling and Hood's categorisation of the 'Seven Cs'

Trilling and Hood's categorisation of the Seven C's

- critical thinking and doing -problem-solving, research, analysis, project management;
- creativity - new knowledge creation, best-fit design solutions, artful storytelling;
- collaboration -cooperation, compromise, consensus, community-building;
- cross-cultural understanding – engagement across diverse ethnic, language, cultural, knowledge and organizational structures;
- communication - exchanging and sharing information, using media appropriately and effectively;
- computing - appropriate and effective use of electronic information and communication technologies;
- career and learning self-reliance - managing change, life long learning and career redefinition

Appendix 2 Excellence in schools White Paper-July1997

Excellence in Schools

White Paper - July 1997

These statements are the direct references to IT/ICT within the government's White Paper outlining its pledge to target Education as one of its highest priorities.

By 2002, we will have:

- Better training for existing teachers to make sure all use the most effective methods of teaching, focused in particular on literacy, numeracy and IT.
- Better developed information and communications technology within a clear strategy.
- Schools linked to a **National Grid for Learning** providing modern teaching and resource material, supported by initiatives such as NetDays.

The National Grid for Learning

- In the last 20 years, business has been transformed by new technology, ie computers and computer networks, but education has been affected only marginally.
- We cannot prepare our children for the world of tomorrow with yesterday's technologies.
- The National Grid for Learning aims:

  (i) to unlock the potential of new technologies in schools

  (ii) to equip pupils and other learners for the new world.

- We are determined to create a society where, within 10 years, information and communications technology has permeated every aspect of education.
- Better teaching and understanding of ICT can both improve the process of teaching and learning and develop pupils' awareness of the potential uses of ICT in work and society.
- It is vital that pupils have a balanced understanding of ICT, knowing when it is appropriate to use new technology.

The Stevenson inquiry into IT in Schools

found evidence that:

(i) new technologies can help children learn faster, enhance career prospects and transform opportunities of children with severe disabilities.

(ii) teachers need extra help to feel confident using and teaching with new technologies.

The convergence of telephone, computer and television technologies has been predicted for some time. The Internet has now brought together computing and telecommunications, and interactive digital television is to be launched next year in the UK. Britain's early lead, however, of schools' technology has been eroded.

To regain the lead we shall:

(i) train teachers - ensuring that all new teachers are ICT literate and retraining existing teachers with National Lottery funding.

(ii) connect all schools - connecting via cable companies etc. schools, colleges and libraries with access charges kept as low as possible.

(iii) provide content - developing plans for a private/public partnership to deliver educational software and services to teachers, pupils and other learners.

(iv) remove barriers to learning - ensuring quality of access for all.

Foundations of Learning

We need to build up a store of knowledge and keep abreast of rapid technological developments if we are to prepare the future generations.

http://www.schools.bedfordshire.gov.uk/meu/excellen.htm

Appendix 3 The research process - Denzin and Lincoln

The Research Process

Phase 1: The Researcher as a Multicultural Subject
- history and research tradition
- conceptions of self and the other
- ethics and politics of research

Phase 2: Theoretical Paradigms and Perspectives
- positivism, postpositivism
- constructivism
- feminism(s)
- ethnic models
- Marxist models
- Cultural studies models

Phase 3: Research Strategies
- study design
- case study
- ethnography, participant observation
- phenomenology, ethnomethodology
- grounded theory
- biographical method
- historical method
- action and applied research
- clinical research

Phase 4: Methods of Collection and Analysis
- interviewing
- observing
- artefacts, documents, and records
- visual methods
- personal experience methods
- data management methods
- computer-assisted analysis
- textual analysis

Phase 5: The Art of Interpretation and Presentation
- criteria for judging adequacy
- the art and politics of interpretation
- writing as interpretation
- policy analysis
- evaluation traditions
- applied research

Taken from Denzin and Lincoln, The Landscape of Qualitative Research, 1998

Appendix 4 Information and consent form

Information for potential research participants

Who is conducting this research?

My name is Cecilia Amey and until recently I worked at a primary school. I was the ICT Subject Manager and ICT Specialist Teacher. At present I am undertaking a Doctor of Education research degree at Southampton University. My research is not being sponsored by any agency and is purely for my thesis.

What is the purpose of this research?

- The research work that I am conducting is part of a study that will lead to a thesis in fulfilment of my doctorate. The purpose of my study is to investigate the current attitudes of teachers to ICT in primary education.

What will be involved if I take part in this research?

If you decide to take part in this research the level of involvement for you will be:

- answering a short questionnaire which will enable me to create an overall profile of my research group (anonymity of individuals and schools will be maintained throughout)
- an initial interview and possibly a follow up interview if there are points that need to be clarified or developed further
- allowing me to observe a lesson where you are using ICT. Prior to this observation, I will talk to you about the points that I shall be observing and your schools ethical and data protection procedures that I will need to adhere to as an observer in your class.

Where and when will the research take place?

Should you decide to take part in this research I will endeavour to arrange interviews and observations at your convenience.

Can I withdraw at any time?

You can withdraw from the research at any time without having to give a reason for doing so. You also have the right to review the interview material, and ask that portions not be used.

Will all information be kept confidential?

With your consent, I will be tape recording the interview and the transcription will be undertaken by me alone. During the transcription process I will use initials for all proper names. I will keep the transcripts and audiotapes in a safe place until my thesis has been accepted. The tapes will then be destroyed or returned to you if this is your request.

If I take part in the research will I have anonymity?

If you decide to take part in this research, your anonymity will be maintained by removing any form of identifiers, such as name, school name and location, in the study.

If I take part in this research, will I or my school benefit in anyway?

If requested, I will provide a summary report of my research findings, which may be used to inform your continuing professional development or your schools future development plans for ICT.

Research Consent Form

Title of Study

Primary teachers' attitudes to ICT in Education

Have you read the information sheet?	Yes / No
Have you had the opportunity to ask questions and discuss the study?	Yes / No
Have you received satisfactory answers to all your questions?	Yes / No
Have you received enough information about the study?	Yes / No
Do you understand that you are free to withdraw from the study:	
▪ at any time	Yes / No
▪ without having to give a reason for withdrawing?	Yes / No
I agree to having the interview audio taped	Yes / No
I agree to having a lesson observed where ICT is used.	Yes / No
Do you agree to take part in this study?	Yes / No

Signed _____

Date _____

(Name in block letters) _____

Appendix 5 Interview schedule used for trial interviews

Research Framework

- teachers' values and priorities regarding ICT
- teachers' confidence and knowledge to use ICT as educators
- teachers' skills, knowledge and understanding of ICT to inform their pedagogy
- teachers' use of ICT as part of the teaching and learning process
- teachers use of ICT as part of the management process of teaching and learning.

	Interview Schedule
Mindset	• What are your general feelings about ICT? • Tell me about your own experience of ICT? • What are your feelings about ICT use in primary education? • What is your opinion about the emphasis placed, by the Government, on ICT in teaching? • Do you feel that you are under pressure from anywhere else?
Perception	• What do you consider the role of ICT to be in the teaching process? • What do you consider the role of ICT to be in the learning process? • What do you consider to be good teaching with ICT?
Psychology	• Can you tell me about your present practice? • How would you describe your use of ICT in teaching? • How would you rate your present practice with regard to ICT? • How confident are you about using ICT in teaching? • Can you give me some examples of what you consider to be effective use of ICT in your teaching?
Perception/Philosophy	• How would you describe your philosophy (thinking) about teaching with ICT? • With ICT in mind, tell me if your philosophy (thinking) has changed over the period that you have been teaching – if so, in what way? • Would you describe ICT as an enabler in the classroom (school) – In what way? • How do you decide to use ICT in a lesson? • What influences your decision? • Tell me how you use ICT in your teaching?

Bearing	• Do you think ICT has had an affect on your teaching? In what way? • What are your views on the integration of ICT into curriculum subjects? • What change has ICT brought to the learning process in your classroom? • Once you have set the ICT task can you tell me how you interact with the pupils? • Suppose I am a pupil in your class what kind of ICT activities have I done today/ this week?
Psychology/Perception	• What benefits or otherwise has ICT brought to you as a teacher? • As part of your management process of teaching, how do you use ICT? • Has it made a difference to your professional life? • Have you used ICT today with regard to your teaching? • Tell me what you used and what you did.
Perception	• Tell me about training you have received. • What do you think about the programmes of training you have received? • Did the training provide you with what you expected? • What effect do you feel that this has had on your ICT use in the classroom? • What opportunities have you had to share your ICT practices with colleagues? • What are your views on sharing practice? • What values and priorities do you place on your professional development in ICT? • What would you consider to be good teaching practice with ICT?
	• Would you say you had a negative or positive attitude towards ICT? • Is there anything else you would like to tell me about? • Would you like to see a transcription of this interview?

Appendix 6 Finalised interview schedule

Interview Schedule
• What are your general feelings about ICT? • Tell me about your own experience of ICT? • What are your feelings about ICT use in primary education? • What is your opinion about the emphasis placed, by the Government, on ICT in teaching? • Do you feel that you are under pressure from anywhere else?
• Can you tell me about your attitude towards ICT? • What do you consider the role of ICT to be in the teaching process? • What do you consider the role of ICT to be in the learning process? • What do you consider to be good teaching with ICT?
• Can you tell me about your present practice? • How would you describe your use of ICT in teaching? • How would you rate your present practice with regard to ICT? • How confident are you about using ICT in teaching? • Can you give me some examples of what you consider to be effective use of ICT in your teaching?
• How would you describe your philosophy (thinking) about teaching with ICT? • With ICT in mind, tell me if your philosophy (thinking) has changed over the period that you have been teaching - if so, in what way? • Would you describe ICT as an enabler in the classroom (school) - in what way? • How do you decide to use ICT in a lesson? • What influences your decision? • Tell me how you use ICT in your teaching?
• Do you think ICT has had an affect on your teaching? In what way? • What are your views on the integration of ICT into curriculum subjects? • What change has ICT brought to the learning process in your classroom?

- Once you have set the ICT task can you tell me how you interact with the pupils?
- Suppose I am a pupil in your class what kind of ICT activities have I done today/ this week?

- What benefits or otherwise has ICT brought to you as a teacher?
- As part of your management process of teaching, how do you use ICT?
- Has it made a difference to your professional life?
- Have you used ICT today with regard to your teaching?

  Tell me what you used and what you did.

- Tell me about training you have received.
- What do you think about the programmes of training you have received?
- Did the training provide you with what you expected?
- What affect do you feel that this has had on your ICT use in the classroom?
- What opportunities have you had to share your ICT practices with colleagues?
- What are your views on sharing practice?
- What values and priorities do you place on your professional development in ICT?
- What would you consider to be good teaching practice with ICT?

- Would you say that you had a negative or positive attitude towards ICT?
- Is there anything else you would like to tell me about?
- Would you like to see a transcription of this interview?

Appendix 7 Sample of completed observation pro forma

Teacher ID: **Date:**

Key Elements of Observation for Analysis

1. Description of Location: YR. R. + 1 (4) - 20 min lesson just right.
Computer Suite
approx 25

2. Type of lesson:
ICT to support Topic Ourselves + mouse control + to work in suite (to build confidence

3. Type of equipment used:
Classroom computer - 1
14 computers in suite
Class teacher
+ TA
+ Student helper

4. Why was it selected (refer to planning):
To use drawing program - Dazzle.
Familiarity with going to suite + mouse control

5. Why is ICT being used (refer to planning):
Topic Ourselves - to try and draw friends face

6. Teacher's perception of the technology

Preparation	Familiarity	Confidence
Comp. switched on · Explained to class about computer mouse and explained important button Machines on + Programs loaded.	Basic knowledge for level of use - 1 click, 2 clicks on mouse. This does not reflect her true level - must remember this	Apologized for the earlyness of the level of work for class

7. Teacher's interaction with pupils

When interaction occurs Proactive (P) Reactive (R)	Who initiates interaction Teacher (T) Pupil (P)	Consequence of interaction Structured (S) Helpful (H) Effective (E) Ad Hoc (A)	Follow up activity	Pupil to pupil support if arises from teacher request
P	T	S. Helped all children to settle at computers	Walked around to make sure all had computers + drawing tablet on screen.	
P	T	H. Praised 2 for good shape	- asked Lara to let Cheyanne have a go	
P	T	(S) Circulated again	Lots of praise as she went around	
R	T	H Showed two pupils how clear screen		
R	T	H Showed another 2 how to put work into duet box	asked them to swap who was controlling mouse.	
R	P	Problem with mouse	Checked - working fine (told them)	
R	T	(H) Told two they had not selected colour	- Showed them how to select colour.	
R	T	Praised two about face.	Got them to swap over.	
R	P	Tears over a chair	A cuddle + problem solved	

7. Teacher's interaction with pupils

When interaction occurs Proactive (P) Reactive (R)	Who initiates interaction Teacher (T) Pupil (P)	Consequence of interaction Structured (S) Helpful (H) Effective (E) Ad Hoc (A)	Follow up activity	Pupil to pupil support if arises from teacher request
P	T	S All class to listen	Paused for using right button on mouse. lined up & returned to class-room	

Appendix 8 Sample of questionnaire

Primary school teachers' attitudes to ICT in education

A. About you

Name: _____

A1. Are you: Male ☐ Female ☐

A2. Did you complete your teacher training prior to 1999?

Yes ☐ No ☐

A3. Have you undertaken NOF training?

Yes ☐ No ☐

A4. Which best describes your role in your school?

(You may tick more than one)

- School Management Team ☐
- ICT Co-ordinator ☐
- Subject Co-ordinator ☐
- Class teacher ☐

B. About your professional use of ICT

B1. How do you use ICT to support your day-to-day teaching work?

- Preparation of teaching materials ☐
- Record keeping ☐
- Report writing ☐
- Access to reports and responses to classroom focused research. ☐
- Access to reports and responses to inspection findings. ☐
- Access to professional discussions ☐
- Access to professional development materials ☐
- Others ☐

Please specify .....

.....

C. Your views about the implementation of ICT in primary education

C1. How do you feel about the introduction of ICT into the primary school curriculum?

C2. What is your opinion about the use of ICT in primary education?

C3. How would you describe your use of ICT in your teaching?

C4. 'Serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum.' What are your views about this statement?

Thank you for making time to complete this questionnaire. All information will be treated in the strictest confidence and anonymity will be preserved throughout.

Appendix 9 Annotated interview schedule from trial

Research Framework

- teachers' values and priorities regarding ICT
- teachers' confidence and knowledge to use ICT as educators
- teachers' skills, knowledge and understanding of ICT to inform their pedagogy
- teachers' use of ICT as part of the teaching and learning process
- teachers use of ICT as part of the management process of teaching and learning.

	Interview Schedule
Mindset	What are your general feelings about ICT? Tell me about your own experience of ICT? What are your feelings about ICT use in primary education? Quest C1 What is your opinion about the emphasis placed, by the Government, on ICT in teaching? Mindset/Phil Quest-C2 Do you feel that you are under pressure from anywhere else? Mindset/Phil
Perception	What do you consider the role of ICT to be in the teaching process? Phil/Psy What do you consider the role of ICT to be in the learning process? Phil/Psy. What do you consider to be good teaching with ICT? Phil/perc.
Psychology	Can you tell me about your present practice? psy/learning How would you describe your use of ICT in teaching? Learning/mindset How would you rate your present practice with regard to ICT? Perc/mindset How confident are you about using ICT in teaching? Phil/perc. Quest C1 Can you give me some examples of what you consider to be effective use of ICT in your teaching? Phil/Psy Quest C3
Perception/Philosophy	How would you describe your philosophy (thinking) about teaching with ICT? Phil With ICT in mind, tell me if your philosophy (thinking) has changed over the period that you have been teaching – if so, in what way? Phil Would you describe ICT as an enabler in the classroom (school) – In what way? Perc/mindset How do you decide to use ICT in a lesson? Learning/psy What influences your decision? Learning/mindset Tell me how you use ICT in your teaching? Psy

Bearing	Do you think ICT has had an affect on your teaching? In what way? Bearing What are your views on the integration of ICT into curriculum subjects? Bearing / Perc. What change has ICT brought to the learning process in your classroom? Perc. Once you have set the ICT task can you tell me how you interact with the pupils? Psy Suppose I am a pupil in your class what kind of ICT activities have I done today/ this week? Perc
Psychology/Perception	What benefits or otherwise has ICT brought to you as a teacher? Bearing / Perc As part of your management process of teaching, how do you use ICT? Bearing Has it made a difference to your professional life? Bearing Have you used ICT today with regard to your teaching? Bearing Tell me what you used and what you did. Bearing
Perception	Tell me about training you have received. Perc. What do you think about the programmes of training you have received? Perc. Did the training provide you with what you expected? Perc. What effect do you feel that this has had on your ICT use in the classroom? Psy What opportunities have you had to share your ICT practices with colleagues? Psy What are your views on sharing practice? Phil What values and priorities do you place on your professional development in ICT? Bearing / Phil What would you consider to be good teaching practice with ICT? Perc / Phil.
	Would you say you had a negative or positive attitude towards ICT? Is there anything else you would like to tell me about? Would you like to see a transcription of this interview?

Appendix 10
QSR—NVIVO Example of coded interview section

What are you general feelings about ICT?
I like ICT I think it's useful for me, it's useful for the children, it's part of the world that we live in and I think you know it's something that everyone has to have an awareness of you know at whatever level that they are you know everyone should be aware of ICT within the world and within the work place.

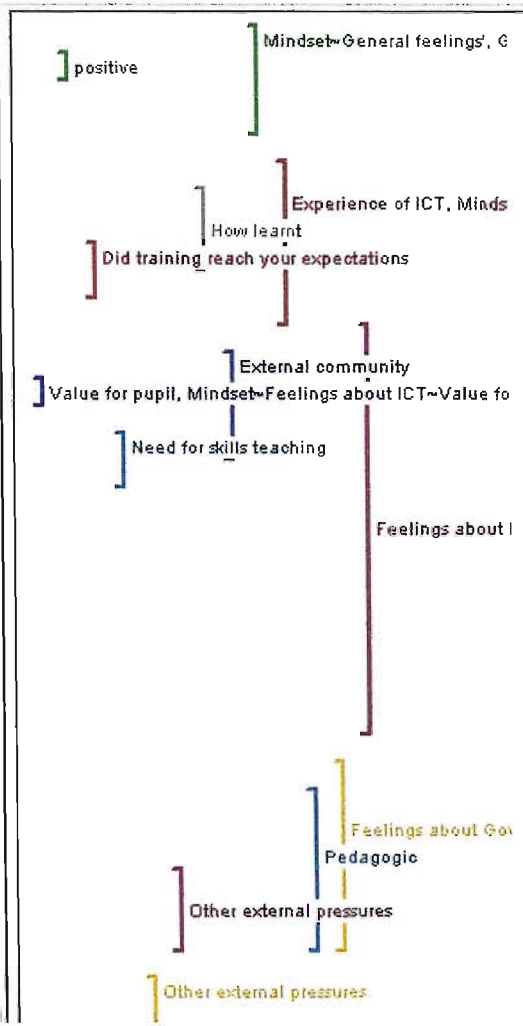
And your own experience of ICT, do you come with previous experience?
Not really, when in was at school you know they started to have like the BBCs and they'd write simple programs but really things like PCs was really when I was doing my training then we had a bit of use of them but most of my ICT has been stuff I've learnt from you know from other people really and just by doing it. You know we have had training but NOF training in school but you know it had you know varying degrees of success but I don't have any background in ICT it's always been come about from what I've just done myself.

What are your feelings about ICT use in primary education?
Um I think it's important for the children that for the children to have access. A lot of them have access at home and it's nice that we can maybe give them something that they haven't seen before that they can then do at home, they can carry on at home but I think not everyone has that opportunity so we need to you know make sure that you know full range of skills by the time they leave us.

How do you cope with children who obviously have computers at home and from fiddle and faff to get skills, how do you cope with children who come with these different ways of getting through to things?
Yeah, I think it's a bit like with maths there's never just one way of doing something I think there's different ways. I think what I try and do is I'd look at the way that they did things and if there's a more efficient way I might show them that or looking at what other people have done you know like kind of get the others to show but I think if they're comfortable and they're able to get the information in their own way but unless you know it's a particular objective that we have to do it in this particular way, I'd be happy for them to do it their own way as long as it was you know an efficient method.

What is you opinion about the emphasis place by the Government on ICT in teaching?
Um it's difficult, I think teachers need to have the um strength to realise that not everything is going to, ICT isn't going to link to everything and every lesson is not going to necessarily show ICT and it's, if ICT can enhance your lesson then than that's great but if you're, if it's, if ICT is there because you think it should be there but it's not actually doing anything then I don't think that's necessarily a healthy thing. I think teachers need to have the courage to say well actually you know it's not going to be in this lesson. So I think the emphasis that we need to do it is right but I think you know like everything it should come with a matter of caution.

Obviously there's statutory pressure to do ICT but do you feel that you're under pressure from anywhere else?
I don't feel pressure because I'm happy with ICT. I'm comfortable with it and I'm happy to try things out and you



Appendix 11 Interview schedule with first level codes

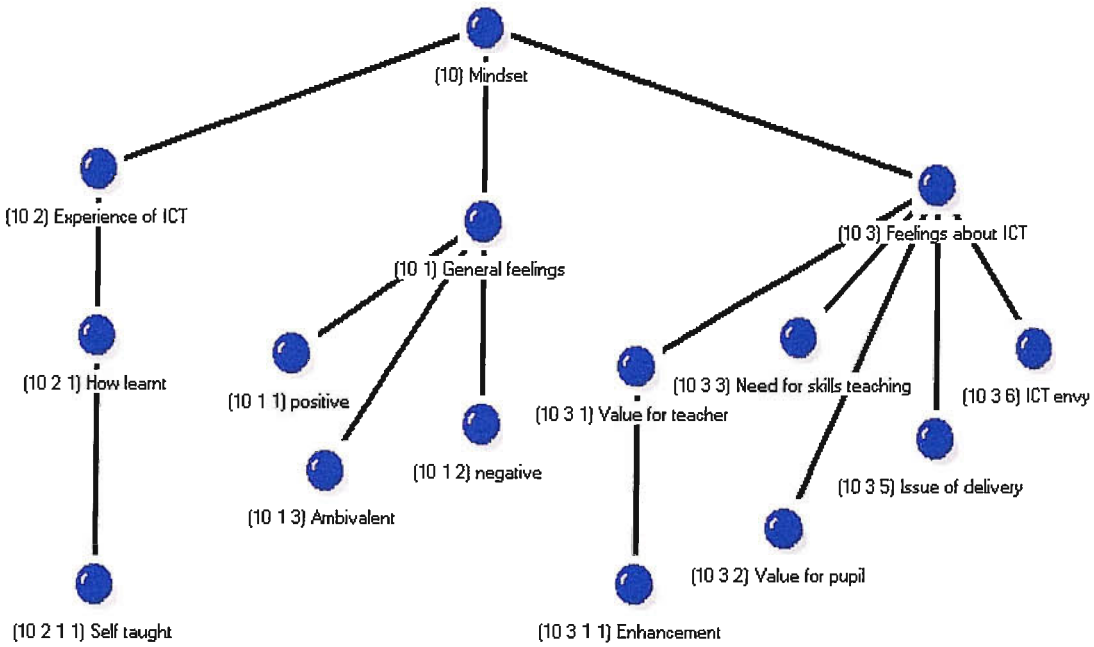
Research Framework

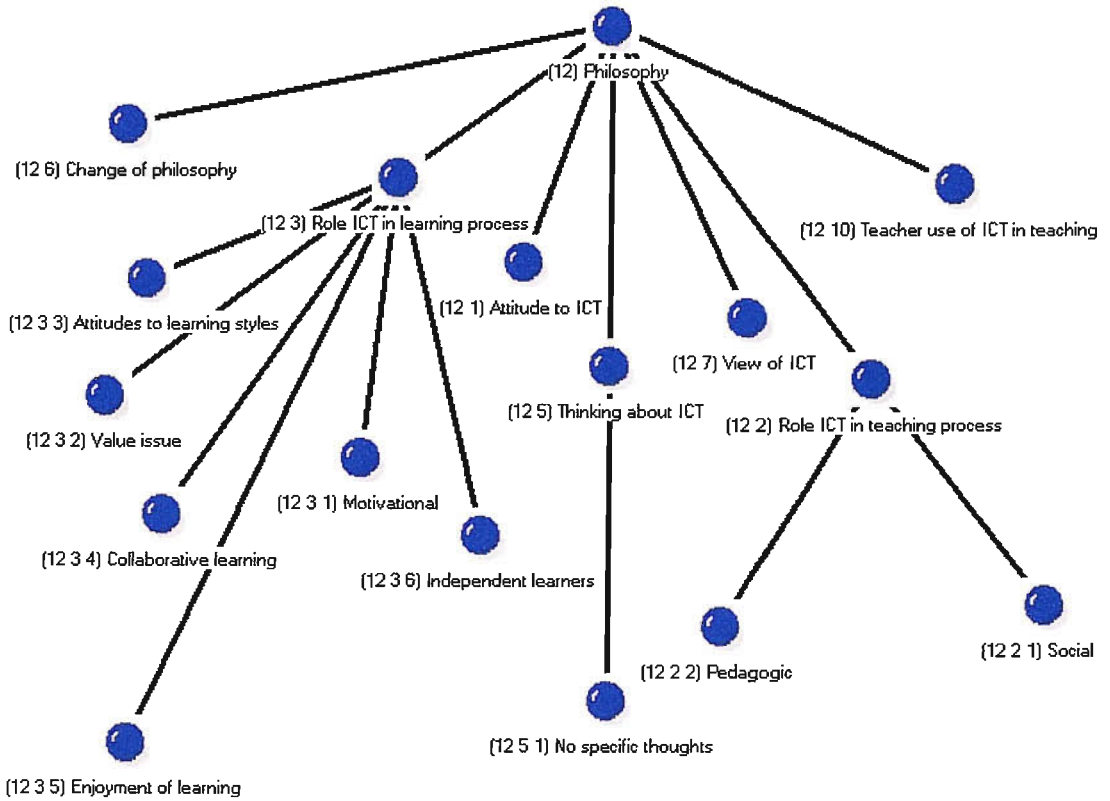
- teachers' values and priorities regarding ICT
- teachers' confidence and knowledge to use ICT as educators
- teachers' skills, knowledge and understanding of ICT to inform their pedagogy
- teachers' use of ICT as part of the teaching and learning process
- teachers use of ICT as part of the management process of teaching and learning.

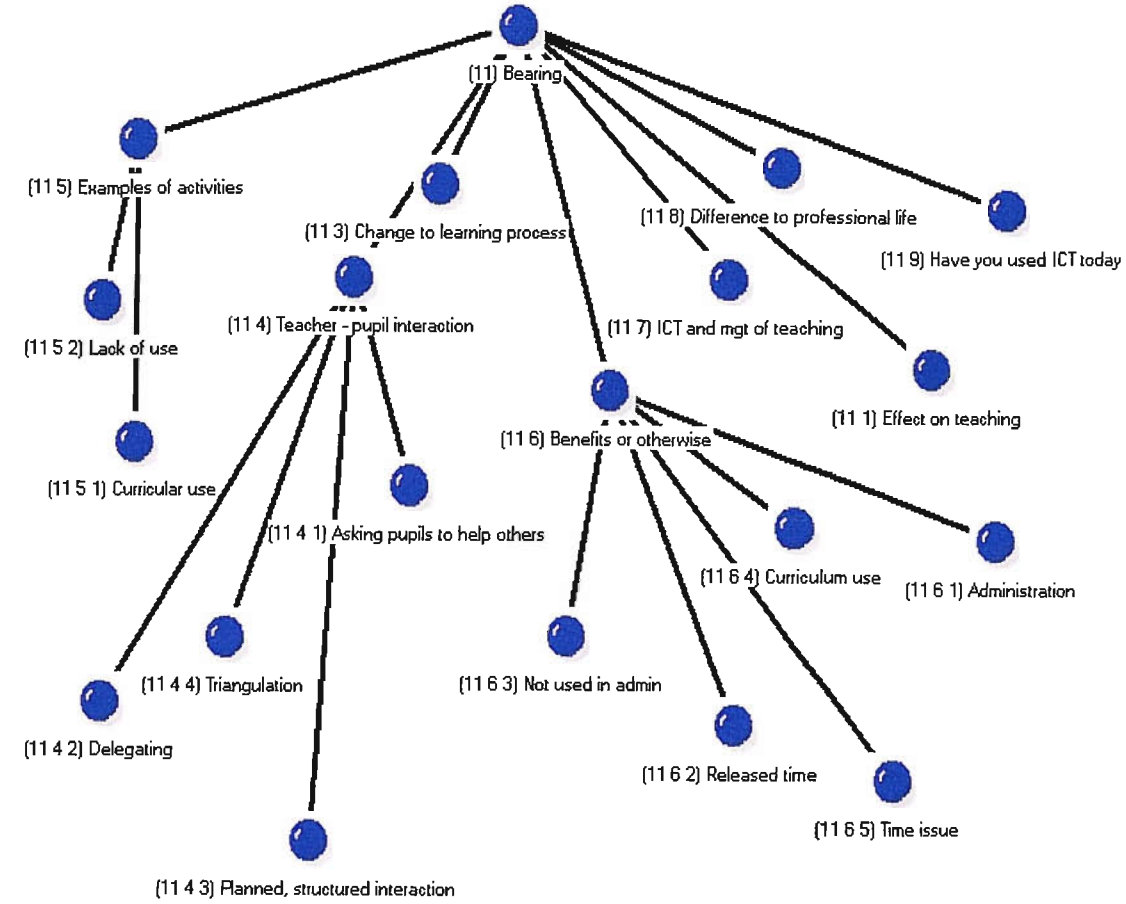
Interview Schedule	First level codes
• What are your general feelings about ICT?	*Mindset*
• Tell me about your own experience of ICT?	*Mindset*
• What are your feelings about ICT use in primary education?	*Mindset*
• What is your opinion about the emphasis placed, by the Government, on ICT in teaching?	*Subjective norm/bearing*
• Do you feel that you are under pressure from anywhere else?	*Subjective norm/bearing*
• What do you consider the role of ICT to be in the teaching process?	*Philosophy*
• What do you consider the role of ICT to be in the learning process?	*Philosophy*
• What do you consider to be good teaching with ICT?	*Affordance*
• Can you tell me about your present practice?	*Psychology*
• How would you describe your use of ICT in teaching?	*Psychology*
• How would you rate your present practice with regard to ICT?	*Constraint*
• How confident are you about using ICT in teaching?	*Constraint*
• Can you give me some examples of what you consider to be effective use of ICT in your teaching?	*Psychology*
• How would you describe your philosophy (thinking) about teaching with ICT?	*Philosophy*
• With ICT in mind, tell me if your philosophy (thinking) has changed over the period that you have been teaching – if so, in what way?	*Psychology*
• Would you describe ICT as an enabler in the classroom (school) – In what way?	*Psychology*
• How do you decide to use ICT in a lesson?	*Constraint*
• What influences your decision?	*Subjective norm*

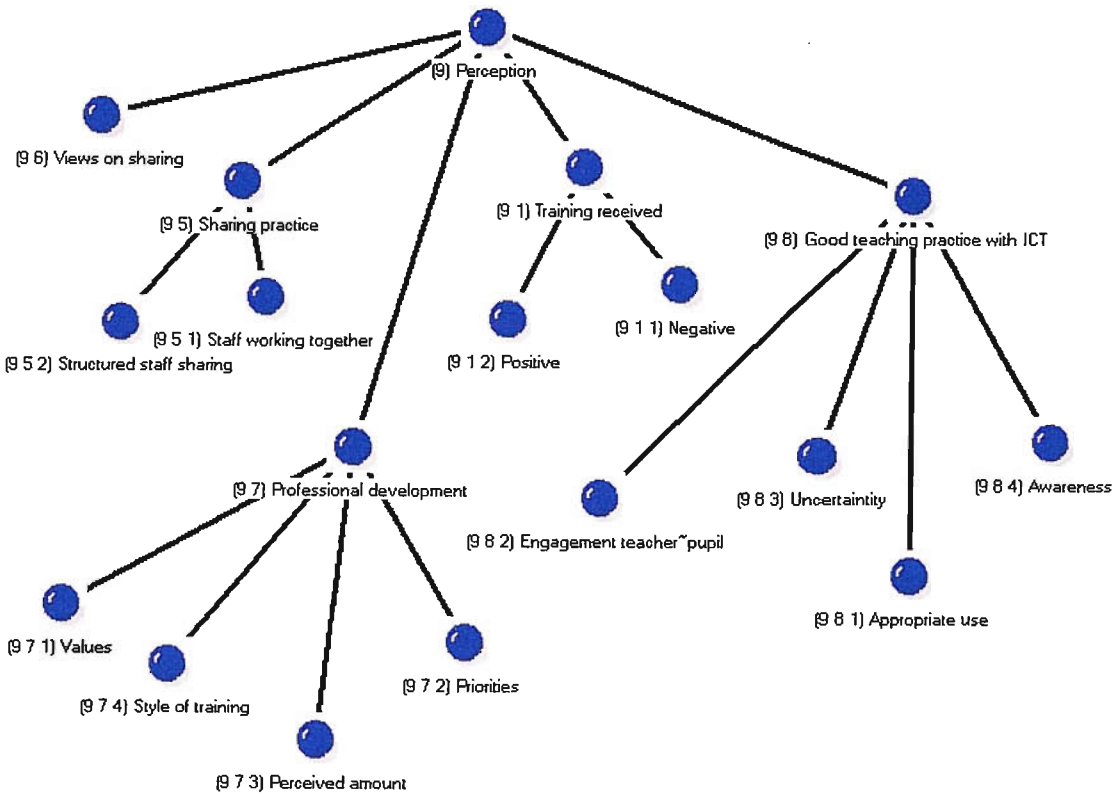
• Tell me how you use ICT in your teaching?	*Philosophy*
• Do you think ICT has had an affect on your teaching? In what way?	*Bearing*
• What are your views on the integration of ICT into curriculum subjects?	*Subjective norm*
• What change has ICT brought to the learning process in your classroom?	*Bearing*
• Once you have set the ICT task can you tell me how you interact with the pupils?	*Bearing*
• Suppose I am a pupil in your class what kind of ICT activities have I done today/ this week?	*Bearing*
• What benefits or otherwise has ICT brought to you as a teacher?	*Bearing*
• As part of your management process of teaching, how do you use ICT?	*Bearing*
• Has it made a difference to your professional life?	*Bearing/psychology*
• Have you used ICT today with regard to your teaching?	*Bearing*
• Tell me what you used and what you did.	*Psychology*
• Tell me about training you have received.	*Perception*
• What do you think about the programmes of training you have received?	*Perception*
• Did the training provide you with what you expected?	*Perception*
• What effect do you feel that this has had on your ICT use in the classroom?	*Subjective norm*
• What opportunities have you had to share your ICT practices with colleagues?	*Perception*
• What are your views on sharing practice?	*Perception*
• What values and priorities do you place on your professional development in ICT?	*Perception*
• What would you consider to be good teaching practice with ICT?	*Perception*
• Would you say you had a negative or positive attitude towards ICT?	
• Is there anything else you would like to tell me about?	
• Would you like to see a transcription of this interview?	

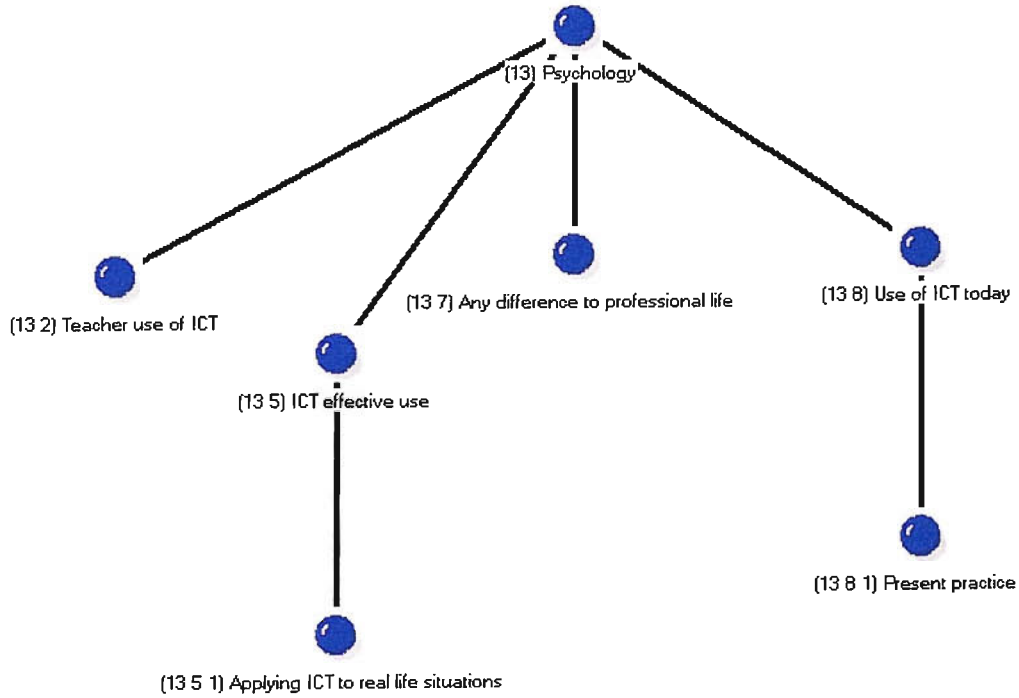
Appendix 12
QSR—NVIVO Node models

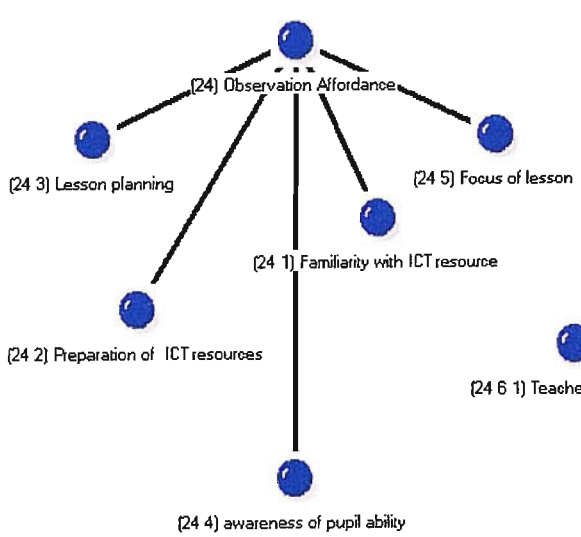


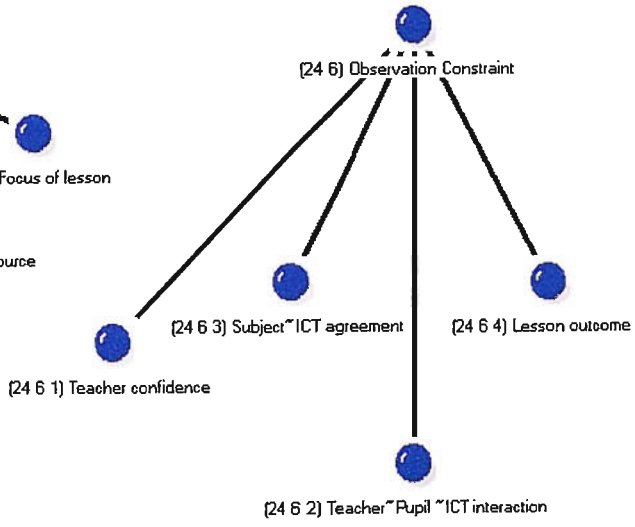



(11) Bearing
(11 5) Examples of activities
(11 3) Change to learning process
(11 8) Difference to professional life
(11 9) Have you used ICT today
(11 4) Teacher - pupil interaction
(11 7) ICT and mgt of teaching
(11 5 2) Lack of use
(11 1) Effect on teaching
(11 6) Benefits or otherwise
(11 5 1) Curricular use
(11 4 1) Asking pupils to help others
(11 6 4) Curriculum use
(11 6 1) Administration
(11 4 4) Triangulation
(11 6 3) Not used in admin
(11 4 2) Delegating
(11 6 2) Released time
(11 6 5) Time issue
(11 4 3) Planned, structured interaction


(9) Perception
(9 6) Views on sharing
(9 5) Sharing practice
(9 1) Training received
(9 8) Good teaching practice with ICT
(9 5 1) Staff working together
(9 5 2) Structured staff sharing
(9 1 2) Positive
(9 1 1) Negative
(9 7) Professional development
(9 8 3) Uncertaintity
(9 8 4) Awareness
(9 8 2) Engagement teacher~pupil
(9 8 1) Appropriate use
(9 7 1) Values
(9 7 2) Priorities
(9 7 4) Style of training
(9 7 3) Perceived amount


(13) Psychology
(13 2) Teacher use of ICT
(13 7) Any difference to professional life
(13 8) Use of ICT today
(13 5) ICT effective use
(13 8 1) Present practice
(13 5 1) Applying ICT to real life situations


(24) Observation Affordance
(24 3) Lesson planning
(24 5) Focus of lesson
(24 1) Familiarity with ICT resource
(24 2) Preparation of ICT resources
(24 4) awareness of pupil ability


(24 6) Observation Constraint
(24 6 3) Subject~ICT agreement
(24 6 4) Lesson outcome
(24 6 1) Teacher confidence
(24 6 2) Teacher~Pupil ~ICT interaction

Appendix 13 QSR-NVIVO Finalised node list report

NVivo revision 2.0.163 Licensee: Ce Amey

Project: EdD User: Administrator Date: 31/03/2006 - 07:03:55
NODE LISTING

Nodes in Set: All Tree Nodes
Created: 01/04/2005 - 16:11:11
Modified: 01/04/2005 - 16:11:11
Number of Nodes: 135

1 (1) /Professional use of ICT
2 (2) /Preparation of teaching materials
3 (3) /Record keeping
4 (4) /Report writing
5 (5) /education reseach
6 (6) /inspection findings
7 (7) /Keeping up to date
8 (8) /Professional development ~a~
9 (9) /Perception
10 (9 1) /Perception/Training received
11 (9 1 1) /Perception/Training received/Negative
12 (9 1 2) /Perception/Training received/Positive
13 (9 5) /Perception/Sharing practice
14 (9 5 1) /Perception/Sharing practice/Staff working together
15 (9 5 2) /Perception/Sharing practice/Structured staff sharing
16 (9 6) /Perception/Views on sharing
17 (9 7) /Perception/Professional development
18 (9 7 1) /Perception/Professional development/Values
19 (9 7 2) /Perception/Professional development/Priorities
20 (9 7 3) /Perception/Professional development/Perceived amount
21 (9 7 4) /Perception/Professional development/Style of training
22 (9 8) /Perception/Good teaching practice with ICT
23 (9 8 1) /Perception/Good teaching practice with ICT/Appropriate use
24 (9 8 2) /Perception/Good teaching practice with ICT/Engagement teacher~pupil
25 (9 8 3) /Perception/Good teaching practice with ICT/Uncertaintity
26 (9 8 4) /Perception/Good teaching practice with ICT/Awareness
27 (10) /Mindset
28 (10 1) /Mindset/General feelings
29 (10 1 1) /Mindset/General feelings/positive
30 (10 1 2) /Mindset/General feelings/negative
31 (10 1 3) /Mindset/General feelings/Ambivalent
32 (10 2) /Mindset/Experience of ICT
33 (10 2 1) /Mindset/Experience of ICT/How learnt
34 (10 2 1 1) /Mindset/Experience of ICT/How learnt/Self taught
35 (10 3) /Mindset/Feelings about ICT
36 (10 3 1) /Mindset/Feelings about ICT/Value for teacher

37 (10 3 1 1) /Mindset/Feelings about ICT/Value for teacher/Enhancement
38 (10 3 2) /Mindset/Feelings about ICT/Value for pupil
39 (10 3 3) /Mindset/Feelings about ICT/Need for skills teaching
40 (10 3 5) /Mindset/Feelings about ICT/Issue of delivery
41 (10 3 6) /Mindset/Feelings about ICT/ICT envy
42 (11) /Bearing
43 (11 1) /Bearing/Effect on teaching
44 (11 3) /Bearing/Change to learning process
45 (11 4) /Bearing/Teacher - pupil interaction
46 (11 4 2) /Bearing/Teacher - pupil interaction/Delegating
47 (11 4 3) /Bearing/Teacher - pupil interaction/Planned, structured interaction
48 (11 4 3 1) /Bearing/Teacher - pupil interaction/Planned, structured interaction/Asking pupils to help others
49 (11 4 4) /Bearing/Teacher - pupil interaction/Triangulation
50 (11 5) /Bearing/Examples of activities
51 (11 5 1) /Bearing/Examples of activities/Curricular use
52 (11 5 2) /Bearing/Examples of activities/Lack of use
53 (11 6) /Bearing/Benefits or otherwise
54 (11 6 1) /Bearing/Benefits or otherwise/Administration
55 (11 6 2) /Bearing/Benefits or otherwise/Released time
56 (11 6 3) /Bearing/Benefits or otherwise/Not used in admin
57 (11 6 4) /Bearing/Benefits or otherwise/Curriculum use
58 (11 6 5) /Bearing/Benefits or otherwise/Time issue
59 (11 7) /Bearing/ICT and mgt of teaching
60 (11 8) /Bearing/Difference to professional life
61 (11 9) /Bearing/Have you used ICT today
62 (12) /Philosophy
63 (12 1) /Philosophy/Attitude to ICT
64 (12 2) /Philosophy/Role ICT in teaching process
65 (12 2 1) /Philosophy/Role ICT in teaching process/Social
66 (12 2 2) /Philosophy/Role ICT in teaching process/Pedagogic
67 (12 3) /Philosophy/Role ICT in learning process
68 (12 3 1) /Philosophy/Role ICT in learning process/Motivational
69 (12 3 2) /Philosophy/Role ICT in learning process/Value issue
70 (12 3 3) /Philosophy/Role ICT in learning process/Attitudes to learning styles
71 (12 3 4) /Philosophy/Role ICT in learning process/Collaborative learning
72 (12 3 5) /Philosophy/Role ICT in learning process/Enjoyment of learning
73 (12 3 6) /Philosophy/Role ICT in learning process/Independent learners
74 (12 5) /Philosophy/Thinking about ICT
75 (12 5 1) /Philosophy/Thinking about ICT/No specific thoughts
76 (12 6) /Philosophy/Change of philosophy
77 (12 7) /Philosophy/View of ICT
78 (12 10) /Philosophy/Teacher use of ICT in teaching
79 (13) /Psychology
80 (13 2) /Psychology/Teacher use of ICT
81 (13 5) /Psychology/ICT effective use
82 (13 5 1) /Psychology/ICT effective use/Applying ICT to real life situations
83 (13 7) /Psychology/Any difference to professional life
84 (13 8) /Psychology/Use of ICT today

85 (13 8 1) /Psychology/Use of ICT today/Present practice
86 (14) /Search Results
87 (14 1) /Search Results/Internal community'
88 (14 2) /Search Results/Perception~Professional development
89 (14 3) /Search Results/Perception~Good teaching practice wi
90 (14 4) /Search Results/Mindset~General feelings'
91 (14 5) /Search Results/Mindset~Experince of ICT'
92 (14 6) /Search Results/Mindset~Feel ~Value for Teacher
93 (14 7) /Search Results/Mindset~Feelings about ICT~Value for
94 (14 8) /Search Results/Mindset~Feelings about ICT~Issue of
95 (14 9) /Search Results/~Bearing~Effect on teaching'
96 (14 10) /Search Results/Bearing~Change to learning process'
97 (14 11) /Search Results/~Bearing~Teacher - pupil interaction
98 (14 12) /Search Results/Single Text Lookup
99 (14 13) /Search Results/Single Text Lookup 2
100 (15) /Affordances
101 (15 4) /Affordances/Good teaching with ICT
102 (15 4 1) /Affordances/Good teaching with ICT/Appropriate use to
103 (15 4 2) /Affordances/Good teaching with ICT/Using prepared stuff and IWB etc
104 (16) /Constraints
105 (16 1) /Constraints/Material availibility
106 (16 3) /Constraints/Rate present practice
107 (16 4) /Constraints/Confidence ~ ICT in teaching use
108 (16 8) /Constraints/Deciding how to use ICT in lesson
109 (18) /Internal community
110 (19) /External community
111 (20) /Futures
112 (21) /Subjective norm
113 (21 1) /Subjective norm/Money issues
114 (21 2) /Subjective norm/Evaluation of programmes of training
115 (21 3) /Subjective norm/Did training reach your expectations
116 (21 4) /Subjective norm/Feelings about Govt expectations
117 (21 4 1) /Subjective norm/Feelings about Govt expectations/Resouces
118 (21 5) /Subjective norm/Other external pressures
119 (21 5 1) /Subjective norm/Other external pressures/Children home computing
120 (21 6) /Subjective norm/Effect of training on ICTin class
121 (21 7) /Subjective norm/Integration in curriculum
122 (21 7 15) /Subjective norm/Integration in curriculum/Not contrived
123 (21 9) /Subjective norm/Influences on use
124 (22) /Thinking and linking
125 (24) /Observation Affordance
126 (24 1) /Observation Affordance/Familiarity with ICT resource
127 (24 2) /Observation Affordance/Preparation of ICT resources
128 (24 3) /Observation Affordance/Lesson planning
129 (24 4) /Observation Affordance/awareness of pupil ability
130 (24 5) /Observation Affordance/Focus of lesson
131 (24 6) /Observation Affordance/Observation Constraint

132 (24 6 1) /Observation Affordance/Observation Constraint/Teacher confidence
133 (24 6 2) /Observation Affordance/Observation Constraint/Teacher~Pupil ~ICT interaction
134 (24 6 3) /Observation Affordance/Observation Constraint/Subject~ICT agreement
135 (24 6 4) /Observation Affordance/Observation Constraint/Lesson outcome

Appendix 14 QSR-NVIVO quality checked node list report

NVivo revision 2.0.163 Licensee: Ce Amey

Project: EdD User: Administrator Date: 31/03/2006 - 07:03:55
NODE LISTING

Nodes in Set: All Tree Nodes
Created: 01/04/2005 - 16:11:11
Modified: 01/04/2005 - 16:11:11
Number of Nodes: 135

Section heading

1 (1) /Professional use of ICT
2 (2) /Preparation of teaching materials
3 (3) /Record keeping
4 (4) /Report writing
5 (5) /education research
6 (6) /inspection findings
7 (7) /Keeping up to date
8 (8) /Professional development -a-

Tick box answers from questionnaire

SH 9 (9) /Perception
10 (9 1) /Perception/Training received 30
11 (9 1 1) /Perception/Training received/Negative 30
12 (9 1 2) /Perception/Training received/Positive 30
13 (9 5) /Perception/Sharing practice 34|35
14 (9 5 1) /Perception/Sharing practice/Staff working together 34
15 (9 5 2) /Perception/Sharing practice/Structured staff sharing 34
16 (9 6) /Perception/Views on sharing 35
17 (9 7) /Perception/Professional development 36
18 (9 7 1) /Perception/Professional development/Values 36
19 (9 7 2) /Perception/Professional development/Priorities 36
20 (9 7 3) /Perception/Professional development/Perceived amount 36
21 (9 7 4) /Perception/Professional development/Style of training 36
22 (9 8) /Perception/Good teaching practice with ICT 37
23 (9 8 1) /Perception/Good teaching practice with ICT/Appropriate use 37
24 (9 8 2) /Perception/Good teaching practice with ICT/Engagement 37
teacher-pupil
25 (9 8 3) /Perception/Good teaching practice with ICT/Uncertaintity 37
26 (9 8 4) /Perception/Good teaching practice with ICT/Awareness 37
SH 27 (10) /Mindset
28 (10 1) /Mindset/General feelings -
29 (10 1 1) /Mindset/General feelings/positive 1
30 (10 1 2) /Mindset/General feelings/negative 1
31 (10 1 3) /Mindset/General feelings/Ambivalent 1
32 (10 2) /Mindset/Experience of ICT 2
33 (10 2 1) /Mindset/Experience of ICT/How learnt 2
34 (10 2 1 1) /Mindset/Experience of ICT/How learnt/Self taught 2
35 (10 3) /Mindset/Feelings about ICT 3
36 (10 3 1) /Mindset/Feelings about ICT/Value for teacher 3

37 (10 3 1 1) /Mindset/Feelings about ICT/Value for teacher/Enhancement 3
38 (10 3 2) /Mindset/Feelings about ICT/Value for pupil 3
39 (10 3 3) /Mindset/Feelings about ICT/Need for skills teaching 3
40 (10 3 5) /Mindset/Feelings about ICT/Issue of delivery 3
41 (10 3 6) /Mindset/Feelings about ICT/ICT envy 3
42 (11) /Bearing
43 (11 1) /Bearing/Effect on teaching 21
44 (11 3) /Bearing/Change to learning process 23
45 (11 4) /Bearing/Teacher - pupil interaction 24
46 (11 4 2) /Bearing/Teacher - pupil interaction/Delegating 24
47 (11 4 3) /Bearing/Teacher - pupil interaction/Planned, structured interaction 24
48 (11 4 3 1) /Bearing/Teacher - pupil interaction/Planned, structured interaction/Asking pupils to help others 24
49 (11 4 4) /Bearing/Teacher - pupil interaction/Triangulation 24
50 (11 5) /Bearing/Examples of activities 25
51 (11 5 1) /Bearing/Examples of activities/Curricular use 25
52 (11 5 2) /Bearing/Examples of activities/Lack of use 25
53 (11 6) /Bearing/Benefits or otherwise 26
54 (11 6 1) /Bearing/Benefits or otherwise/Administration 26
55 (11 6 2) /Bearing/Benefits or otherwise/Released time 26
56 (11 6 3) /Bearing/Benefits or otherwise/Not used in admin 26
57 (11 6 4) /Bearing/Benefits or otherwise/Curriculum use 26
58 (11 6 5) /Bearing/Benefits or otherwise/Time issue 26
59 (11 7) /Bearing/ICT and mgt of teaching 27
60 (11 8) /Bearing/Difference to professional life 28
61 (11 9) /Bearing/Have you used ICT today 29
SH 62 (12) /Philosophy
63 (12 1) /Philosophy/Attitude to ICT 6
64 (12 2) /Philosophy/Role ICT in teaching process 7
65 (12 2 1) /Philosophy/Role ICT in teaching process/Social 7
66 (12 2 2) /Philosophy/Role ICT in teaching process/Pedagogic 7
67 (12 3) /Philosophy/Role ICT in learning process 8
68 (12 3 1) /Philosophy/Role ICT in learning process/Motivational 8
69 (12 3 2) /Philosophy/Role ICT in learning process/Value issue 8
70 (12 3 3) /Philosophy/Role ICT in learning process/Attitudes to learning styles 8
71 (12 3 4) /Philosophy/Role ICT in learning process/Collaborative learning 8
72 (12 3 5) /Philosophy/Role ICT in learning process/Enjoyment of learning 8
73 (12 3 6) /Philosophy/Role ICT in learning process/Independent learners 8
74 (12 5) /Philosophy/Thinking about ICT 15
75 (12 5 1) /Philosophy/Thinking about ICT/No specific thoughts 15
76 (12 6) /Philosophy/Change of philosophy 16
77 (12 7) /Philosophy/View of ICT 17
78 (12 10) /Philosophy/Teacher use of ICT in teaching 11
SH 79 (13) /Psychology
80 (13 2) /Psychology/Teacher use of ICT 11
81 (13 5) /Psychology/ICT effective use 14
82 (13 5 1) /Psychology/ICT effective use/Applying ICT to real life situations 14
83 (13 7) /Psychology/Any difference to professional life 28
84 (13 8) /Psychology/Use of ICT today 29

85 (13 8 1) /Psychology/Use of ICT today/Present practice 29.

SH 86 (14) /Search Results
87 (14 1) /Search Results/Internal community'
88 (14 2) /Search Results/Perception~Professional development
89 (14 3) /Search Results/Perception~Good teaching practice wi
90 (14 4) /Search Results/Mindset~General feelings'
91 (14 5) /Search Results/Mindset~Experince of ICT'
92 (14 6) /Search Results/Mindset~Feel ~Value for Teacher
93 (14 7) /Search Results/Mindset~Feelings about ICT~Value for
94 (14 8) /Search Results/Mindset~Feelings about ICT~Issue of
95 (14 9) /Search Results/~Bearing~Effect on teaching'
96 (14 10) /Search Results/Bearing~Change to learning process'
97 (14 11) /Search Results/~Bearing~Teacher - pupil interaction
98 (14 12) /Search Results/Single Text Lookup
99 (14 13) /Search Results/Single Text Lookup 2

SH 100 (15) /Affordances
101 (15 4) /Affordances/Good teaching with ICT 9
102 (15 4 1) /Affordances/Good teaching with ICT/Appropriate use to 9
103 (15 4 2) /Affordances/Good teaching with ICT/Using prepared stuff and IWB etc 9

SH 104 (16) /Constraints
105 (16 1) /Constraints/Material availibility 21+9
106 (16 3) /Constraints/Rate present practice 12
107 (16 4) /Constraints/Confidence ~ ICT in teaching use 13
108 (16 8) /Constraints/Deciding how to use ICT in lesson 18
109 (18) /Internal community 34, 35
110 (19) /External community 34, 35
111 (20) /Futures – come out of data.

SH 112 (21) /Subjective norm
113 (21 1) /Subjective norm/Money issues 3
114 (21 2) /Subjective norm/Evaluation of programmes of training 31
115 (21 3) /Subjective norm/Did training reach your expectations 32
116 (21 4) /Subjective norm/Feelings about Govt expectations 4
117 (21 4 1) /Subjective norm/Feelings about Govt expectations/Resouces 4
118 (21 5) /Subjective norm/Other external pressures 5
119 (21 5 1) /Subjective norm/Other external pressures/Children home computing 5
120 (21 6) /Subjective norm/Effect of training on ICTin class 33
121 (21 7) /Subjective norm/Integration in curriculum 22
122 (21 7 15) /Subjective norm/Integration in curriculum/Not contrived 22
123 (21 9) /Subjective norm/Influences on use 18+19
124 (22) /Thinking and linking

SH. 125 (24) /Observation Affordance
126 (24 1) /Observation Affordance/Familiarity with ICT resource - KM
127 (24 2) /Observation Affordance/Preparation of ICT resources - KM
128 (24 3) /Observation Affordance/Lesson planning – KM
129 (24 4) /Observation Affordance/awareness of pupil ability - KM
130 (24 5) /Observation Affordance/Focus of lesson
SH·131 (24 6) /Observation Affordance/Observation Constraint

132 (24 6 1) /Observation Affordance/Observation Constraint/Teacher confidence KM
133 (24 6 2) /Observation Affordance/Observation Constraint/Teacher--Pupil ~ICT interaction— KM
134 (24 6 3) /Observation Affordance/Observation Constraint/Subject~ICT agreement KM
135 (24 6 4) /Observation Affordance/Observation Constraint/Lesson outcome KM.

Additional Heading -

Subjective norm 6
Affordances 1
Constraints 2
Thinking + thinking 7
Internal community 3
External community 4
Futures 5

Appendix 15 Node list regrouped to research framework

Background

28 (10 1) /Mindset/General feelings -B

29 (10 1 1) /Mindset/General feelings/positive -B

30 (10 1 2) /Mindset/General feelings/negative -B

31 (10 1 3) /Mindset/General feelings/Ambivalent -B

32 (10 2) /Mindset/Experience of ICT -B

33 (10 2 1) /Mindset/Experience of ICT/How learnt -B

34 (10 2 1 1) /Mindset/Experience of ICT/How learnt/Self taught –B

41 (10 3 6) /Mindset/Feelings about ICT/ICT envy –

63 (12 1) /Philosophy/Attitude to ICT -

77 (12 7) /Philosophy/View of ICT –B

1. Teachers' values and priorities regarding ICT

10 (9 1) /Perception/Training received -1

11 (9 1 1) /Perception/Training received/Negative -1

12 (9 1 2) /Perception/Training received/Positive –1

17 (9 7) /Perception/Professional development -1

18 (9 7 1) /Perception/Professional development/Values -1

19 (9 7 2) /Perception/Professional development/Priorities –1

20 (9 7 3) /Perception/Professional development/Perceived amount –1

21 (9 7 4) /Perception/Professional development/Style of training -1

35 (10 3) /Mindset/Feelings about ICT -1

36 (10 3 1) /Mindset/Feelings about ICT/Value for teacher - 1

37 (10 3 1 1) /Mindset/Feelings about ICT/Value for teacher/Enhancement -1

40 (10 3 5) /Mindset/Feelings about ICT/Issue of delivery –1

74 (12 5) /Philosophy/Thinking about ICT -1

75 (12 5 1) /Philosophy/Thinking about ICT/No thoughts –1

110 (19) /External community –1

113 (21 1) / Subjective norm/Money issues -1

114 (21 2) / Subjective norm/Evaluation of programmes of training -1

115 (21 3) / Subjective norm/Did training reach your expectations -1

116 (21 4) / Subjective norm/Feelings about Govt expectations -1

117 (21 4 1) / Subjective norm/Feelings about Govt expectations/Resources -1

118 (21 5) / Subjective norm/Other external pressures -1

119 (21 5 1) /Sub. norm/Other external pressures/Children home computing –1

2. Teachers' confidence and knowledge to use ICT as educators

13 (9 5) /Perception/Sharing practice -2

14 (9 5 1) /Perception/Sharing practice/Staff working together -2

15 (9 5 2) /Perception/Sharing practice/Structured staff sharing –2

16 (9 6) /Perception/Views on sharing –2

76 (12 6) /Philosophy/Change of philosophy –2

85 (13 8 1) /Psychology/Use of ICT today/Present practice –2

106 (16 3) /Constraints/Rate present practice -2

109 (18) /Internal community –2

3. Teachers' skills, knowledge and understanding of ICT to inform their pedagogy

23 (9 8 1) /Perception/Good teaching practice with ICT/Appropriate use -3

24 (9 8 2) /Perception/Gd teaching pract with ICT/Engagement teacher~pupil -3

25 (9 8 3) /Perception/Good teaching practice with ICT/Uncertainty -3

104 (9 8 4) /Perception/Good teaching practice with ICT/Awareness –3

38 (10 3 2) /Mindset/Feelings about ICT/Value for pupil -3

39 (10 3 3) /Mindset/Feelings about ICT/Need for skills teaching –3

45 (11 4) /Bearing/Teacher - pupil interaction -3

46 (11 4 2) /Bearing/Teacher - pupil interaction/Delegating -3

47 (11 4 3) /Bearing/Teacher - pupil interaction/Planned, structured interaction –3

48 (11 4 3 1) /Bearing/Teacher - pupil interaction/Asking pupils to help others -3

49 (11 4 4) /Bearing/Teacher - pupil interaction/Triangulation -3

50 (11 5) /Bearing/Examples of activities -3

51 (11 5 1) /Bearing/Examples of activities/Curricular use -3

52 (11 5 2) /Bearing/Examples of activities/Lack of use -3

61 (11 9) /Bearing/Have you used ICT today –3

64 (12 2) /Philosophy/Role ICT in teaching process -3

65 (12 2 1) /Philosophy/Role ICT in teaching process/Social -3

66 (12 2 2) /Philosophy/Role ICT in teaching process/Pedagogic -3

67 (12 3) /Philosophy/Role ICT in learning process –3

68 (12 3 1) /Philosophy/Role ICT in learning process/Motivational -3

69 (12 3 2) /Philosophy/Role ICT in learning process/Value issue -3

70 (12 3 3) /Philosophy/Role ICT in learning process/Att. to learning styles -3

71 (12 3 4) /Philosophy/Role ICT in learning process/Collaborative learning -3

72 (12 3 5) /Philosophy/Role ICT in learning process/Enjoyment of learning -3

73 (12 3 6) /Philosophy/Role ICT in learning process/Independent learners –3

78 (12 10) /Philosophy/Teacher use of ICT in teaching -3

80 (13 2) /Psychology/Teacher use of ICT –3

81 (13 5) /Psychology/ICT effective use -3

82 (13 5 1) /Psychology/ICT effective use/Applying ICT to real life situations –3

101 (15 4) /Affordances/Good teaching with ICT -3

102 (15 4 1) /Affordances/Good teaching with ICT/Appropriate use to -3

103 (15 4 2) /Affordances/Gd teaching with ICT/Using prepd stuff and IWB etc –3

108 (16 8) /Constraints/Deciding how to use ICT in lesson -3

107 (16 4) /Constraints/Confidence ~ ICT in teaching use –3

120 (21 6) / Subjective norm/Effect of training on ICT in class -3

121 (21 7) /Subjective norm/Integration in curriculum -3

122 (21 7 15) / Subjective norm/Integration in curriculum/Not contrived -3

123 (21 9) / Subjective norm/Influences on use –3

126 (24 1) /Observation Affordance/Familiarity with ICT resource –3

127 (24 2) /Observation Affordance/Preparation of ICT resources -3

128 (24 3) /Observation Affordance/Lesson planning -3

129 (24 4) /Observation Affordance/awareness of pupil ability -3

130 (24 5) /Observation Affordance/Focus of lesson –3

132 (24 6 1) /Observation Aff/Observation Constraint/Teacher confidence -3

133 (24 6 2) /Observation Aff/Obs Constraint/Teacher~Pupil ~ICT interaction -3

134 (24 6 3) /Observation Aff/Obs Constraint/Subject~ICT agreement -3

135 (24 6 4) /Observation Aff/Obs Constraint/Lesson outcome -3

4. Teachers use of ICT as part of the teaching and learning process

43 (11 1) /Bearing/Effect on teaching –4

44 (11 3) /Bearing/Change to learning process -4

103 (16 1) /Constraints/Material availability – 4

5. Teachers use of ICT as part of the management process of teaching and learning

1 (1) /Professional use of ICT

2 (2) /Preparation of teaching materials -5

3 (3) /Record keeping -5

4 (4) /Report writing –5

5 (5) /education research –5

6 (6) /inspection findings -

7 (7) /Keeping up to date

8 (8) /Professional development ~a~

53 (11 6) /Bearing/Benefits or otherwise -5

54 (11 6 1) /Bearing/Benefits or otherwise/Administration -5

55 (11 6 2) /Bearing/Benefits or otherwise/Released time -5

56 (11 6 3) /Bearing/Benefits or otherwise/Not used in admin -5

57 (11 6 4) /Bearing/Benefits or otherwise/Curriculum use -5

58 (11 6 5) /Bearing/Benefits or otherwise/Time issue –5

59 (11 7) /Bearing/ICT and mgt of teaching -5

60 (11 8) /Bearing/Difference to professional life -5

83 (13 7) /Psychology/Any difference to professional life –5

Unallocated

9 (9) /Perception (node heading)

27 (10) /Mindset (node heading)

42 (11) /Bearing (node heading)

62 (12) /Philosophy (node heading)

79 (13) /Psychology (node heading)

100 (15) /Affordances (node heading)

104 (16) /Constraints (node heading)

111 (20) /Futures (not used – no significant value)

112 (21) /Subjective norm (node heading)

124 (22) /Thinking and linking (not used – no significant value)

125 (24) /Observation Affordance (node heading)

131 (24 6) /Observation Affordance/Observation Constraint (node heading)

Appendix 16 Details of observed lessons

Scenario in which each observation took place

Observation number	Location of Lesson	Equipment used	Type of Lesson	Why ICT used –Teachers' focus	Why ICT selected – Pupils focus	Year Group
1	Two classroom (3 computers in each room) + Computer Suite (5) Two pupils per computer	PCs Projector Interactive Whiteboard Multimedia CD Rom about India	Geography / ICT	For research. More interactive and accessible. Using sound to address reading issues.	To assist pupils to find similarities and differences between a village in India and their own village. Worksheet given out	Years 3&4
2	Computer Suite	PCs PowerPoint	ICT / PHSE	To compare two types of presentation media - drama and computer visual presentations	For pupils to produce a PowerPoint presentation	Year 6
3	Classroom	Laptops Projector Roamer SuperLogo	ICT	To get turtle to turn through 90^0	Control Technology - taking pupils on from controlling floor turtle to screen turtle	Years 1&2
4	Classroom (2)	PCs Barnaby Bear P.B. Bear	Free Choice of 6 activities	Geography Skills To fit in with term's topic	Mouse Control	Years R&1
5	Computer Suite	PCs Projector Word	ICT / Literacy	ICT Skills - alter font, type, size, colour and use effects	To design Calligrams	Year 3
6	Computer Suite	PCs Projector Word	ICT / Literacy	To write a formal letter. ICT skills – font, size and alignment. Part of a unit of ICT	To produce word processed copies of narrative/non-narrative text	Year 4

Observation number	Location of Lesson	Equipment used	Type of Lesson	Why ICT used	Why ICT selected	Year Group
7	Computer Suite	PCs Projector Excel- generic Spreadsheets program Internet site – www.sainburystoyou.co	Science / ICT	To support a science lesson about healthy eating by shopping for foodstuffs from all the food groups and keeping within a budget of £20	To gather information on food prices from website. Enter information onto a spreadsheet to work to a budget	Year 5
8	Classroom	Interactive whiteboard with touch pen Teacher's laptop	Maths -teacher using ICT	IWB used to demonstrate division using the chunking method	As a teaching tool	Year 5 & 6
9	Computer Suite	PCs Dazzle	ICT / Topic -	To develop confidence going to suite and mouse control	To draw a picture of their partners face for their topic work	Year R & 1
10	Classroom	Interactive whiteboard with touch pen Teacher's laptop	Literacy	IWB used as white/chalkboard	Teacher presentation tool	Year 3 & 4
11	Computer Suite	PCs Dazzle	ICT / Literacy	Skills development	Poetry presentation copied from paper copy	Year 4 & 5
12	Computer Suite	PCs Internet	ICT	To introduce lesson about web pages – used pre-selected sites as examples. So pupils can compare different web pages	To assist pupils to find examples of good web pages. To recognise features of good web page design	Year 6
13	Computer Suite	PCs Word	ICT/Literacy	To replace text by highlighting and overwriting	For skills development	Year 3