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# AN INVESTIGATION INTO THE PROCESS OF TEACHER ASSESSMENT OF ICT CAPABILITY IN A SAMPLE OF SCHOOLS IN THE NORTH WEST OF ENGLAND

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A thesis submitted to the University of Huddersfield in partial fulfilment of the requirements for the degree of Doctor of Education (EdD).

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# Abstract

This small-scale study into the summative assessment practices in ICT of schools in the North West of England identifies a lack of consistency in teacher assessment at the end of KS3.

Central to the research is a consideration of what is meant by ICT capability. This phrase is important in this research because it is the term used in Government policy documents to indicate what schools are to assess in ICT at the end of KS3. Hence, if ICT assessment is to be consistent, there should be a shared understanding of this term. The research explores the lack of common understanding of the term in literature and then goes on to illustrate how this lack of understanding is mirrored in schools. This results in inconsistency of practice in assessing ICT in schools. This inconsistency of practice is explored through in-depth interviews with a number of Heads of Department from a range of Secondary Schools in the North West of England.

Alongside the main consideration of assessment of ICT, the research also explores recent trends in assessment practices in English schools. The problematic nature of summative assessment is discussed as indicated by the attempts in the English National Curriculum to link assessment to observable and measurable criteria and how this leads to more and more trivialisation of what is being assessed. Assessment 'backwash' is considered where the outcomes of summative assessment are used in ways for which they were not originally intended; for example where summative assessment results such as those generated at the end of KS3 are used to measure the overall 'quality' of a school in comparison with other schools. Brief consideration is given to the recent focus on formative assessment techniques, as typified by the 2008 UK Government publication of an Assessment for Learning Strategy, although only in order to illustrate emerging assessment practices in schools.

A range of implications for schools and their assessment practices (particularly in relation to ICT) are identified.

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# Dedications and Acknowledgements

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My wife, Susan has provided much needed support throughout. Her continued encouragement and motivation has been a source of great strength at all times.

# List of abbreviations

| | |
|---|---|
| AfL | Assessment for Learning |
| CSV | Comma Separated Variable |
| DiDA | Diploma in Digital Applications |
| DCSF | Department for Children Schools and Families |
| DES | Department for Education and Science |
| DfE | Department for Education |
| DfEE | Department for Education and Employment |
| DfES | Department for Education and Skills |
| EAL | English as an Additional Language |
| FSM | Free School Meals |
| GCSE | General Certificate of Secondary Education |
| HOD | Head of Department |
| ICT | Information Communication Technology |
| IT | Information Technology |
| ITTE | IT in Teacher Education |
| KS | Key Stage |
| KS1 | Key Stage 1 (school years 1 and 2) |
| KS2 | Key Stage 2 (school years 3, 4, 5 and 6) |
| KS3 | Key Stage 3 (school years 7, 8 and 9) |
| KS4 | Key Stage 4 (school years 10 and 11) |
| L4 | Level 4 in the National Curriculum Attainment |
| L5 | Level 5 in the National Curriculum Attainment |
| LA | Local Authority |
| LEA | Local Education Authority |
| LO | Learning Objective |
| MS | Microsoft$^{©}$ |
| NC | National Curriculum |
| NW | North West |
| OFSTED | Office for Standards in Education |
| QCA | Qualifications and Curriculum Authority |
| QCDA | Qualifications and Curriculum Development Agency |
| SEN | Special Educational Needs |
| SIMS | Schools Information Management System |
| SOW | Scheme of Work |
| TAMS | Textual Analysis and Mark-up System |
| TDA | Training and Development Agency for Schools |
| TGAT | Task Group on Assessment and Testing |
| UA | Unitary Authority |

| Y7 | Year 7 (first year of secondary school – children aged 11/12) |
| Y8 | Year 8 (second year of secondary school – children aged 12/13) |
| Y9 | Year 9 (third year of secondary school – children aged 13/14) |

# Chapter 1 – Introduction

## *Context*

This thesis concerns the practice of summative assessment of Information Communication Technology (ICT) capability in school throughout Key Stage 3 (KS3). The National Curriculum (NC) for England requires schools to assess pupils' capability in ICT although, as Webb (2002) points out, the NC statements for ICT are vague in comparison with other subjects and focus 'almost exclusively on skills and processes rather than knowledge' (Webb, 2002, p. 244). The revised NC (QCA, 2007), Crawford (2001), Kennewell et al (2000), Mills (2003) all provide some useful guidance on the nature of ICT capability; although, in discussing the definition of ICT as a subject, Hadjerrouit (2009, p. 156), notes '… there has not yet been found a coherent theory that takes into consideration the manifold aspects of ICT'. Given the rapidly changing nature of technology, this is not surprising. ICT is a complex and multifaceted subject and any attempt to set boundaries around the subject for curriculum purposes is likely to produce more controversy than agreement. Hence defining ICT capability is problematic and the subsequent discussion in Chapter 2 (Literature Review) and Chapter 4 (Analysis of Data) will consider the difficulties in defining ICT capability at length. Yet, if it is not possible to define capability with any certainty, teachers who are assessing ICT in schools are likely to be equally unclear about what it is they are assessing, and the most appropriate way to assess it. The latest review by OFSTED of the teaching of ICT in School (OFSTED, 2010) indicates that assessment is still the weakest area of ICT teaching and provision and that only 20% of schools surveyed had reliable and consistent means of tracking progress in ICT (OFSTED, 2010, p.29). This calls into question the reliability and validity of assessment of ICT and also its fitness for purpose. In addition, the uncertainty over the definition of ICT and how it is assessed may also provide insight into what schools think ICT as a subject within the curriculum is for.

This research seeks to determine how clear schools are about what they are assessing in ICT at KS3 and, as a consequence, how reliable and valid this assessment might be. By investigating assessment of ICT, it will be possible to infer how schools are viewing ICT as a subject in the curriculum. As Handy (1994) suggests, it is all too easy to measure what we can easily measure and then give value to that which we measure. Hence, the process of assessment gives value to certain types of activity and behaviour which in turn exert a powerful influence on the subject curriculum in a process sometimes referred to as 'backwash' (Snow, 1990, p. 435). Thus the assessment 'tail' 'wags' the curriculum 'dog'. There are important implications here for assessment of the NC in general in that the specific focus of this research on ICT assessment may illustrate some of the wider issues that apply to all of the assessment of NC subjects in school.

The National Curriculum (NC) for England requires schools to assess pupils' capability in ICT throughout KS3 in order to produce a single reported level of attainment by the end of the Key Stage (that is at the end of Year 9) when the pupil is 13/14 (DfEE, 1999). The levels range from Level 1 to Level 8 and a description of attainment at each level is contained within the NC orders for the subject. Reporting of this level at the end of KS3 is a statutory requirement placed upon schools (QCA, 2009, p. 18). For ICT, the level is determined

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by a process of Teacher Assessment in that the class teacher uses the evidence produced by the pupil and knowledge of the pupil to determine a level for their attainment at the end of the Key Stage (KS). In the 1999 NC, the Department for Education and Employment (DfEE) (known as the Department for Children, Schools and Families (DCSF) until May 2010 when it became the Department for Education (DfE)) set targets that indicated that the average pupil should reach Level 5 on the NC levels by the end of KS3 (DfEE, 1999, p.7). Although the 2007 revision to the National Curriculum (QCA, 2007) went some way to free up the curriculum so that greater opportunities for more creative approaches to subject teaching were encouraged, the basic process of Teacher Assessment of ICT capability at the end of KS3 remains.

The Office for Standards in Education (OFSTED) reported in 2000 that there was a significant difference in assessment standards at KS3 among schools that had been inspected during the 2 year period covered by their report. In addition OFSTED indicated that standards of ICT teaching and learning were below standards in other subjects in the curriculum in many schools (OFSTED, 2000). These comments were set within a context where there was a general recognition that standards of attainment in Secondary Schools in England needed to be raised (OFSTED, 2002). The progress made in raising standards within Primary Schools since the introduction in 1989 of the Literacy and Numeracy Strategies was not being reflected in the standards in Secondary Schools.

Up to 2001 there was little official guidance from the Qualifications and Curriculum Authority (QCA) available to schools as to how this assessment should be carried out in practice and also how consistency could be achieved within the current Y9 classes in the school, across Y9 classes from earlier cohorts or indeed across Y9 cohorts from different schools. However, in 2002 the QCA (known as QCDA since 2009) through the DfES introduced a KS3 Strategy that was designed to raise standards in Secondary Schools (DfES, 2002a). Right at the commencement of this strategy, ICT was targeted as a subject where standards needed to be raised and in 2002 a framework document (*The Key Stage 3 Framework for Teaching ICT Capability*) was published that established a clear context for the subject at KS3, along with Learning Objectives for the various strands of the subject. This was then followed over a timescale of 2 years by the release of sample teaching materials and resources for schools to use and adapt as they saw fit. Whilst this framework and the published teaching materials were never intended to be mandatory, in the first years of their existence many schools did adopt the sample units more or less as written.

Part of the reason for this reaction by schools was a reflection of the emphasis within the KS3 Strategy for ICT on the notion of ICT capability. Up to that point, many schools had been content to concentrate on the teaching of skills in the use of ICT applications and they had not considered how these skills could be combined to produce 'capability' in the use of the technology as a whole. In some ways, this was because the notion of capability in ICT is rather vague and often contentious (ACITT, 2003). The discussion surrounding capability will be summarised elsewhere in this dissertation, but it is true to say that a single accepted definition of ICT capability remains an elusive goal.

Along with the release of the KS3 Strategy materials, regional training delivered by Local Education Authorities (LEA) was offered to schools. Initially this training concentrated on familiarising teachers with the Strategy materials that had been produced, but during 2003 a series of workshops was held on a regional basis to consider assessment of ICT. The motivation behind these workshops was to improve the accuracy and consistency of the assessment process so that the level that was awarded to pupils at the end of KS3 would be more consistent and reliable across schools and cohorts. The workshops used sample materials and examples of pupil work from schools to practise marking and (particularly) moderating the marks awarded for the work.

Notwithstanding this training designed to improve the overall standard of assessment of ICT at KS3, at the same time a programme was commissioned through the National Assessment Agency to produce an on-line assessment test that could be sat by all pupils at the end of Y9. The first pilot testing took place in 2004 with a limited number of schools. This was followed by a more extensive pilot involving 402 schools in 2005 (QCA, 2005b, p.5).

Testing at the end of KS3 in English, Mathematics and Science had been a reality for pupils since 1993 and pupils throughout the country sat a paper based test in these subjects during May in the year they reached the end of the KS. Although there are arguments against national testing of this type (these arguments will be rehearsed elsewhere in this dissertation), at least the QCA could ensure that the assessment process was largely consistent and that accuracy in the levels awarded to pupils at the end of the KS in these subjects was easier to achieve than for those subjects (such as ICT) that relied exclusively on Teacher Assessment.

The idea of an on-line test of ICT Capability at the end of KS3 has some merit in that at least with an on-line test the process is likely to be more valid and reliable as an assessment mechanism for ICT than the use of a paper based test. The test environment was set in a virtual world where the pupil was provided with an electronic in-tray-out-tray exercise which required them to respond to requests that were generated by e-mail. The whole testing environment was self-sufficient and all the activities were generated by the test without teacher intervention. The test was also marked electronically and an overall level was awarded based on the pupil's performance. It is not the intention of this dissertation to describe in detail the on-line test, but this brief summary is included in order to provide some context about it so that where reference is made to the test elsewhere, the basic nature of the instrument is understood. In January 2007, the Secretary of State for Education announced that this on-line test would not be mandated as had previously been planned, but would remain an option for schools to use as a supplement to their Teacher Assessment in the future. In general, this policy decision was met with approval (Adam, 2007), and, as will be discussed later, the inherent problems associated with on-line testing mean that few teachers were sorry to see this initiative end.

A further concern is related to the purposes of summative assessment in schools. As Kelly (2009, p.151) identifies, the original NC Assessment Programme did not include summative assessment at KS 3; however,

by 1989 the (then) Department for Education and Skills (DfES) directed that assessment should be summative at all key stages. As Kelly goes on to illustrate (p. 151 – 152), this direction from the DfES predicated a shift in the purpose of assessment to a position where assessment data is used to measure the relative value of schools through the introduction of school league tables. As a result of this, there is a clear danger that the assessment process assumes an importance that is out of proportion to its original intent. Snow (1990, p. 435) defines this as the 'backwash effect'. By evaluating the worth of schools according to their assessment outcomes, the assessment process drives the curriculum to change so that schools teach that which will be assessed in order to maximise their potential for success in the league tables. This practice can, when taken to extreme, undermine the whole basis of the subject curriculum.

Over the past decade in England, successive Governments have used assessment data of a variety of kinds to measure the value of schools. League tables of results from Standard Attainment Tests and GCSE and A Level public examinations have been published to illustrate a hierarchy of school performance at these various phases of education; the idea being to inform people (particularly parents) of the performance of their local schools and provide a comparison with other schools in the surrounding area. The obvious implication from these published league tables is that a school at the top of the table is better than a school at the bottom and the percentage A* to C pass rates at GCSE of schools is used as a measure of overall worth of the school. Parents will naturally want to send their children to good schools, and so position in the league tables becomes an important tool for the school to attract new pupils and hold on to the existing ones. Schools lower down the table are likely to see pupil numbers dwindling as their pupils are moved to higher performing schools and so a poor position in the table becomes a downward spiral from which some schools find it difficult to break free. Assessment thus has become what Brooks (2002) and Harlen and Deakin Crick (2002 and 2003) refer to as a 'high stakes' process which can have a significant effect on the future of the school. The importance of this 'high stakes' assessment has led to some dubious practice within schools where lower performing pupils are deliberately excluded from the figures. One such practice in use in a few schools is where pupils are entered into GCSE examinations as private candidates so that the school does not need to include them in their published school figures and so the school's GCSE percentage pass rate is not affected by lower ability pupils (HMC, 2004, p.5).

Whilst this may not have been the intention, the use of assessment as a measurement of value of the school has placed schools in a difficult position. At the same time, the National Strategy has increasingly emphasised the use of assessment as a formative tool to support learning through target setting (DfES, 2002b). This has led to tension and confusion within schools and a lack of clarity about what they are using assessment for. Fundamental to this research is a perspective on what assessment in schools is used for so I will seek to determine how schools make decisions about the content of their ICT Curriculum at KS3 and how their assessment practices are influencing these decisions.

The requirement for a summative, end of KS level provides another difficulty in terms of what assessment is being used for. In the ICT NC, there are five strands of study. Four out of Five of these strands can be seen as more or less discrete topic areas with the fifth as a unifying strand running across all other strands. During

Y7 and Y8, pupils are assessed in each of the strands separately. Only at the end of KS3 (Y9) are these individual assessments brought together to form one single summative level of attainment at the end of the KS. As noted above, the KS3 Strategy for ICT produced a Scheme of Work and teaching resources to support the delivery of ICT in the curriculum. According to findings published by the DfES (2004), many schools stick very closely to the KS3 ICT Strategy Scheme of Work in Y7 and Y8 and yet ignore it completely in Y9 where the scheme is intended to provide opportunities for pupils to demonstrate their capability across all strands of the ICT NC. Due to the way in which the Strategy scheme has been devised, topics and strands are visited once within each year at KS3 and so opportunities for progression and development within the year are limited for any one child. Also, by electing to bypass the Y9 scheme, schools are denying their pupils the opportunity to demonstrate their ICT attainment at the end of the KS in any structured way. So the end of KS3 judgement provided on pupils is largely based on historical evidence from Y8 or even Y7. Given that the expectation is that most pupils should make at least one full level of progress in a key stage, this practice would suggest that the real level of pupil attainment is being under represented. Also, because these unifying Y9 study units are being bypassed, the drawing together of a child's attainment across all strands of the NC is not happening. The schools then have to interpret how the individual levels in single strands are brought together into one final level for a pupil at the end of Y9. Whilst the process of levelling was never intended to be precise – the DfEE (1999) advice mentions notions of 'best-fit' for a level – this practice of combining levels from individual strands does seem to make the summative process even more imprecise.

Another practice that calls this summative levelling into question is where schools do not cover all the strands of the ICT NC in any systematic way at all. For example, the OFSTED 2002/03 Subject Report (OFSTED 2004) identifies that control and monitoring has been poorly taught in many ICT lessons in schools. There are a number of factors behind this, not least of which is the technical knowledge and understanding of ICT teachers in schools. As a consequence, many schools have avoided the topic in the KS3 ICT curriculum completely and based their end of KS assessment level on the other strands in the curriculum whilst ignoring this one. It is also fair to say that this topic spans more than one curriculum subject as it appears in the ICT, the Design Technology as well as the Science curriculum. This could be another reason for lack of consistency in coverage of the topic in that schools are placing the responsibility for delivering this topic in the curriculum outside the ICT department.

My experience of working with schools within the North West (NW) Region over a period of years provided anecdotal evidence of a number of practices being used that would suggest a lack of consistency in coverage of the ICT curriculum (as suggested above). This research will seek to provide a more systematic identification of how widespread these practices are.

A lack of clarity over the nature of ICT knowledge and the increasing importance of assessment as a curriculum driver have important implications for what is taught in ICT in schools and what is considered important to include in the ICT curriculum. The relative newness of ICT as a curriculum subject in schools and the constantly changing nature of ICT in general provide challenges for the clear definition of what

constitutes an up to date curriculum in ICT. Consequently, the pedagogy of teaching ICT is immature and susceptible to change (particularly from policy initiatives from central government). One factor contributing to the immaturity of ICT pedagogy is, as Webb (2002, p. 244) indicates, the lack of qualifications in ICT held by teachers in school. Although this situation has improved since Webb's (2002) study, due to the continued training of teachers to teach ICT as their main subject, many schools still use non-ICT subject specialists to teach the ICT Curriculum to KS3 pupils. Consideration in this research will be given to who is delivering and assessing the ICT curriculum in schools; what are their experience and qualifications. Furthermore what subject-based development is provided to teachers in the schools participating in this study to determine what lessons might be learnt for future training and development of ICT teachers.

## *Justification for the Research*

A study of the assessment of ICT at KS3 is important in order to establish how school practice is interpreting and then assessing ICT capability. A lack of clarity is likely to result in inconsistency of practice and unreliability of assessment. If assessment is unreliable in ICT, then its value as an indication of what pupils know about the subject and the progress they have made during the KS is called into question. It is also important to determine how much assessment practice is driving the content of the ICT curriculum in schools. If assessment is exerting an undue influence on the school curriculum by aligning what is taught with what can easily be measured, then it is questionable if schools can be sure that they are really equipping pupils with the ICT knowledge and understanding necessary for their future in the information economy. Finally it is important to determine how schools are equipping their teaching staff to deliver and assess the ICT curriculum in the light of rapid technological change and a general immaturity of pedagogy in the subject area.

At the moment there is little research relating to the assessment of the ICT curriculum as taught in schools in England. There has been considerable attention paid to the way in which ICT may assist pupils to learn overall, but very few researchers have paid any attention to ICT as it is taught, and particularly how it is assessed in schools at this level.

Evidence from the summary reports of OFSTED Inspections in 1998 and 1999 indicated that ICT was inconsistently taught and poorly assessed (OFSTED, 2000). In many cases schools were non-compliant at both KS3 and KS4 and were not delivering the curriculum. As a consequence, and in order to bring some consistency to the teaching within the maintained school sector, in 2002 *The Key Stage 3 Framework for Teaching ICT Capability* was launched (DfES, 2002a) and resources to support the teaching of all strands of the ICT national Curriculum were released to schools over 2002 and 2003. This material was and is non-statutory in nature, but many schools within the region this research studied adopted the resources. In the first instance these resources were used with little if any modification, although since that time most schools have adapted the material to suit the context and circumstances of their school. Alongside this a major investment in ICT resources in terms of hardware and software has also been funded and schools have been able to update their facilities. This national emphasis on the importance of ICT has, according to OFSTED, resulted in a more consistent delivery of the subject and an accompanying improvement in the

resourcing of ICT in schools (OFSTED, 2009). In addition, given the highlight placed upon the subject through initiatives such as *The Framework for Teaching ICT Capability* (DfES 2002a), schools have also been more systematic in consideration of how ICT fits into their curriculum and, consequently, compliance has improved. OFSTED reports since 2000 indicate a significant improvement in the quality of delivery of ICT within the curriculum (although the inspection process still found evidence of poor practise in assessing ICT (OFSTED, 2010)).

Whilst this improvement in the overall teaching of ICT represents good news for the position of ICT within the curriculum, it is true to say that the nature of the subject has changed within this time period in that strong emphasis has been placed on pupil's ICT capability rather than delivering a curriculum that focuses on ICT skills (National Strategies, (2007)). However, there is some continuing debate about what is meant by capability in this sense and there is still an argument amongst ICT professionals in the field about the relative merits of ICT skills based development (ACITT, 2003). Within this research, attention will be paid to exploring the nature of capability in ICT and then determining whether or not that is what is being assessed in schools. An investigation of what is being assessed will provide an important indication of how schools view and value ICT as a curriculum subject and whether the rapid pace of change in technology is reflected in school ICT curriculum content delivery and assessment.

Along with the increased emphasis on ICT within the curriculum, there has also been an emergent realisation of the significance of assessment as a process to aid learning rather than using assessment purely as a tool to discover what has or has not been learnt. Building on the work of Black and Wiliam (1998), the DCSF has produced resources for schools and emphasised the value of Assessment for Learning (AfL) as a means of improving pupil performance (DCSF, 2008). It seems timely therefore that some consideration is given to how this increased focus on the methods and uses of assessment in schools be looked at in terms of its impact on the practice of ICT departments.

A final reason of the value of this research at this time is the recent intention to introduce an on-line testing mechanism for assessing KS3 ICT. Whilst the plans to introduce this as a compulsory element of the end of Key Stage 3 testing were somewhat surprisingly abandoned by the Government in early 2008, followed later in the year by the complete abandonment of testing for English, Mathematics and Science at KS3, the considerable investment into the on-line testing mechanism is unlikely to disappear altogether and there is mounting interest in on-line testing methods. Because of this interest, on-line testing for ICT at Key Stage 3 will be considered in this discussion as the impact it had on schools and the investment that it generated provides some interesting perspectives. Additionally, at the time of the interview phase of this research, a number of schools involved in the research were piloting the on-line test and it seems useful to include their experience of the process.

## *Research Questions*

For all these reasons, it seems timely to research assessment of ICT within schools.

The central question that this research seeks to address is how the practices of assessment of ICT capability at KS3 illuminate the role of ICT as a subject in the school curriculum. However, in order to investigate this question, it is necessary to ask some subsidiary questions.

Firstly:

What is meant by ICT capability? In exploring this question, I will consider; what schools are currently doing when they assess ICT capability at KS3 (including how they define capability); how schools ensure validity, reliability and consistency of assessment and whether the assessment methods currently being used can be relied upon?

Next:

What are the purposes of assessment of ICT at KS3? Central to addressing this question will be consideration of what schools are using end of KS3 ICT assessment for and how the assessment process is shaping curriculum content.

Finally:

How are schools equipping their teaching staff to deliver and assess the ICT Curriculum? In addressing this question I will consider the qualifications and experience of ICT teaching staff and the implications for training and development of ICT teachers.

Throughout, there will be a consideration of the implications for assessment at KS3 in general (beyond the assessment of ICT) as well as the implications for the teaching of the subject and assessment practices raised by the responses to the questions above.

I intend to explore fully the theoretical background to these questions in the following chapter.

# Chapter 2 – Literature Review

## *Introduction*

In this chapter, the theoretical background to the research is considered. Starting with a brief summary of the nature of NC assessment practice, consideration is then given to the validity and reliability in relation to assessment. The nature of ICT Capability is discussed at length in order to provide a theoretical framework within which to consider and analyse the research findings later in the thesis. A consideration of the methods of assessment is undertaken, particularly as these methods relate to current issues in the practice of assessment in schools. Whilst much of the literature is grounded in an ICT context, care has been taken to ensure that a wide range of relevant theoretical sources have been reviewed and included in this discussion.

## *The Origins of the Current Assessment Regime at Key Stage 3*

### The National Curriculum and Principle of Consistency of Entitlement

A National Curriculum was introduced into all English maintained schools in 1988. This provided a standard, statutory core curriculum to all pupils up to the age of 16. Although the original aims of this NC are open to criticism (White, 2006), one of the consequences (perhaps unintended, or at least unforeseen) of a statutory national curriculum has been to secure a consistency of entitlement for all pupils in the country. Indeed, in subsequent versions of the NC, this entitlement has been enshrined so that the latest iteration of the KS3 and KS4 curriculum (2007) specifically identifies the four purposes of the NC as: establishing an entitlement; establishing standards; promoting continuity and coherence and promoting public understanding. These purposes provide a useful benchmark against which to consider assessment practice in schools. If the NC is to achieve these four purposes nationally, assessment must be configured and practised so that it is in sympathy with these purposes. In order to determine whether or not assessment practice does achieve these four purposes, it is necessary to have some understanding of how NC assessment is carried out.

### NC Assessment

Since the inception of the NC, assessment has broadly consisted of two main types. For the so called 'core' subjects of English, Mathematics and Science there have been end of Key Stage (KS) tests (at KS1 (7 years old), KS2 (11 years old) and KS3 (14 years old)) additionally supported by Teacher Assessment in those subjects. All the other curriculum subjects (with the exception of RE which is not assessed) have been assessed by Teacher Assessment alone. Between 2004 – 2007 an end of KS3 on-line ICT test was piloted. However, this on-line test was scrapped in early 2008.

Sainsbury (1994) identifies 5 main purposes for NC assessment:

> formative – providing information on where a pupil is, enabling teachers to plan the next stages;
> summative – providing overall information on the achievement of pupils;
> evaluative – providing aggregated information on classes and schools to address curriculum issues, as well as the functioning of teachers and schools;

informative – providing information to parents about their own children as well as general information about the school;
for professional development – giving teachers greater sophistication in assessment, recording and monitoring so they can evaluate their own work.
(Sainsbury, 1994, p. 2)

These assessment purposes find resonance in the earliest Task Group on Assessment and Testing (TGAT) publications relating to assessment of the introduction of the NC into schools in the 1980s (DES 1988). As Kelly, (2009, p. 151) indicates, the evaluative purpose of assessment has become much more important over the last decade as league tables have been used by parents, the media and government as a means of measuring the worth of schools. However, in the classroom, the use of assessment for formative or summative purposes is a daily feature of classroom interaction and so for most teachers a much more immediate concern and aspect of their practice. This research considers formative assessment in respect of the pedagogic and assessment techniques that Assessment for Learning has introduced, however, the main purpose of assessment under consideration is summative assessment and how KS3 summative assessment in particular is carried out in ICT. In trying to discover what schools are doing when they assess pupils in ICT at the end of KS3, this research has concentrated on assessment practice within the school contexts involved in this study.

## Assessment Practice

Increasingly, assessment in English schools is being used not just for what could be defined as educational purposes, that is the improvement of pupil performance or teaching practice, but it is also being used to hold schools, teachers and pupils to account. This has been particularly evident in the English Educational System over the past decade with the introduction of league tables indicating the performance of school cohorts in national tests both in the primary and secondary phases of education. A large-scale study of New Zealand teachers carried out by Brown (2004) illustrates that whilst teachers are generally clear about the potential for assessment practices to improve teaching and learning, they are also often in tension over the use of assessment for evaluative and informative purposes of school and pupil accountability, and the consequences of this tension can change the emphasis of the school curriculum.

Rowntree (1977, p. 11) identifies a number of questions that need to be addressed when considering assessment of students. Among them are what to assess, the purposes of assessment and how to assess. As Newton (2007) indicates, there is still much confusion over the terminology used in the area of assessment, particularly in relation to the purposes of assessment and, if anything, this confusion has been compounded in the last 10 years with the increasing emphasis in England of the use of formative assessment tools. Similarly Taras, 2005 and 2007, notes the confusion over terminology. The difficulties the literature identifies in distinguishing what, how and why assessment takes place are practical difficulties faced by schools on a daily basis and, increasingly, the purposes of assessment are being driven by issues other than improving pupil performance or teaching effectiveness. This research will need to determine the significance of the effect of this in the schools involved in the study.

When reviewing the literature, it is often difficult to tease out the distinction between Rowntree's three categories (above). As a consequence, I intend to consider these questions within a framework of four headings that acknowledge the symbiosis between Rowntree's categories and which concentrate on the practice of assessment of ICT in schools. The framework will consider questions relating to the nature of ICT capability; the methods of assessment used; the way pupil progress is tracked and records are kept and the methods used to improve accuracy and consistency in assessment. By using this framework it will be possible to compare practice as defined by the literature surrounding the assessment of ICT and the practice I have identified in schools within this research. As noted above, consideration of accuracy and consistency in assessment practice must be framed within an understanding of the validity and reliability of the assessment that is being carried out.

## Validity and Reliability

Any discussion about assessment has at some point to consider notions of validity and reliability. Validity, in that for an assessment to be valid, it must be assessing what it purports to be assessing. According to Messick (1993):

> Validity is an overall evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores.
> (Messick, 1993, p. 13)

For example, it would not be valid to assess a physical activity such as running 100 metres by asking a pupil to write an essay about the race. That is not to say that writing an essay about a race is not assessing something, but it is not assessing the pupil's ability to run. Wragg (2001, p. 20 – 22) provides a helpful summary when he identifies four aspects that affect the validity of a particular form of assessment, namely; face validity – does the assessment appear as if it is assessing what it purports to asses?, content validity – does the assessment reflect the content of the course or topic?, concurrent validity – does the assessment provide similar results to other forms of assessing the same thing?, and predictive validity – is the assessment a good predictor of future outcomes? However, as Cronbach (1982) indicates:

> Validity is subjective rather than objective: the plausibility of the conclusion is what counts. And plausibility, to twist a cliché, lies in the ear of the beholder.
> (Cronbach, 1982, p. 108)

Thus as Bruner (1990) notes, validity is interpretive rather than objective in nature.

Commenting in 2000, Stobart (2001) provides a useful summary of the difficulties in defining validity and then the complexity of applying measures of validity to NC Assessment. He prefers Messick's (1989) definition of 'consequential' validity and then examines NC assessment on English, Mathematics and Science in an 8 stage framework of threats to validity proposed by Crooks, Kane and Cohen in 1996. His conclusion is that:

> … the validity of National Curriculum Assessment hinges on the balance between Teacher
> Assessment and testing.
> (Stobart, 2001, p. 26)

Hence, by implication, some element of testing is necessary in order to secure validity in NC assessment.

Reliability is about the replicability of the assessment instrument. For example, if the same assessment tool is used with two different but similar groups of pupils in similar conditions, will it produce similar results? Rowntree (1977, p. 188 – 198) summarises some of the potential difficulties and pitfalls of the reliability of assessment methods. He contends that in many assessment circumstances, subjectivity of the assessment is central and thus reliability is questionable. Even with the increasing use of standardised or objective testing Rowntree would question the reliability of the assessment instrument (1997, p. 193). Harlen (2007, p. 22) contends that in informal assessment circumstances (particularly when teachers are using formative assessment techniques), reliability is less important. The assessment process here is individual and specific to a particular pupil, so it is not important if it is replicable for other pupils or in different circumstances. However, she goes on to indicate that formal assessment processes do need reliability. In a comprehensive literature review on the reliability of marking of public examinations in the British Educational System, Meadows and Billington (2005) acknowledge:

> … the inherent unreliability associated with assessment in general, and associated with marking in
> particular.
> (Meadows and Billington, 2005, p. 68)

As Wiliam (2000) indicates:

> The validity-reliability relationship is thus one of focus. For a given amount of testing time, one can
> get a little information across a broad range of topics, as is the case with national curriculum tests,
> although the trade-off here is that the scores for individuals are relatively unreliable. One could get
> more reliable tests by testing only a small part of the curriculum, but then that would provide an
> incentive for schools to improve their test results by teaching only those parts of the curriculum
> actually tested.
> (Wiliam, 2000 p. 13)

Here Wiliam is pointing out the unreliability of NC testing, but perhaps more significantly he also illustrates how a narrowing of the assessment of the curriculum would improve reliability, but have the unintended consequence of limiting that which is taught. Hence the assessment process would directly drive the curriculum content that schools deliver. This issue will be returned to on page 40.

Questions of validity and reliability are important, particularly in relation to formal assessment techniques such as tests or examinations, or to summative assessment events such as the end of KS assessment referred to in this research. If the methods of assessment used in these circumstances are invalid or unreliable, then the results or conclusions from the assessment are equally invalid and unreliable. As much formal assessment exists within our educational system within England, teachers cannot afford to be complacent about the validity and reliability of the assessment tools they choose. Within the discussion of findings from the research, consideration will be given to the means by which assessment practice takes

note of matters of validity and reliability, and also where it is found to be lacking in consideration of these matters. One area where there is scope for concern over the validity and reliability of assessment in ICT is in relation to the definitions around what is being assessed. In order to explore this more fully, the next section considers the nature of ICT capability at length.

## *The Assessment of ICT Capability*

An exploration of what is meant by ICT capability and how it may be assessed is central to a consideration of the questions set out in this research. Hence, significant space and time will be spent in this section summarising the discussion around this area and a number of alternative views will be considered.

The NC for ICT is quite clear in that it states that teachers are assessing pupils' ICT capability. However, when it comes to the process of assessing ICT capability in pupils, the NC statement is not easy to unpick:

> ICT capability involves information gathering, presentation and technical processing skills, underpinned by understanding of key concepts related to the nature of information and of technology. It includes, but is much broader than, a set of technical competencies in common software applications.
> DfES (2002a, p. 9)

The revised NC from 2007 is more helpful in that it identifies ICT capability as one of the Key Concepts of ICT. It then goes on to state that Capability is:

> a.    Using a range of ICT tools in a purposeful way to tackle questions, solve problems and create ideas and solutions of value.
> b.    Exploring and using new ICT tools as they become available.
> c.    Applying ICT learning in a range of contexts and in other areas of learning, work and life.
> QCA (2007, p.122)

However, these statements still do not clearly identify specifically what is to be taught or what is to be assessed. In the light of this, teachers are faced with the prospect of trying to decide what and how to assess pupil capability without a clear understanding of what ICT capability really is. As Wolf (1993), writing about assessment in general indicates, any specification provider for an assessor:

> … must be constructed in a clear and unambiguous way that anyone involved in writing test items or constructing assessments will know exactly what to do.
> (Wolf, 1993, p. 6)

Unfortunately, despite the initial intention to make NC assessment a criterion referenced process, the NC statements above give us a far from clear and unambiguous definition of capability and clear criteria against which to measure it. As a consequence there are significant questions about the validity and reliability of teacher assessment of ICT. We need to explore what is meant by capability further to determine if the assessment methods used in practice are both valid and reliable.

The emphasis on capability in the teaching, learning and assessment of ICT is aligned with a more general identification and emergence of a capability based approach to education. In a wider (non-ICT) context, Cairns (2000) builds on the work begun in the UK in the 1980s and formalised by the publication of an '*Education for Capability Manifesto*' (Royal Society for the Encouragement of Arts Manufactures and Commerce, 1996). According to Cairns (2000) capability is defined as:

> ...having justified confidence in your ability to take appropriate and effective action to formulate and solve problems in both familiar and unfamiliar and changing settings.
> (Cairns, 2000, p. 1)

Hence he considers that capability is something that transcends 'competence', although he admits that practical definitions of what constitutes 'capability; in any field are elusive and often illusory (2000, p. 2). Phelps, Hase and Ellis (2005) agree that the emphasis on competence in ICT education has dominated both literature and practice and that a new focus on capability is overdue. Their research identifies the essential complexity of student thinking and learning and that capability is difficult to enshrine in pre-determined objectives or criteria. Consequently the assessment of capability requires a complex mixture of techniques and processes. In the context of Higher Education, Stephenson (1998) refines the distinction between competence and capability further:

> Capability embraces competence but is an integration of knowledge, skills, personal qualities and understanding used appropriately and effectively – not just in familiar and highly specialist contexts but in response to new and changing circumstances. It concerns forward thinking, the developmental realisation of potential and the capacity to pay attention to and learn from experience (in all its forms). … Capability is a necessary part of specialist expertise, not separate from it. Capable people not only know about their specialisms; they also have the confidence to apply their knowledge and skills within varied and changing situations and to continue to develop their specialist knowledge and skills long after they have left formal education.
> (Stephenson, 1998, p. 3)

However much these definitions may be worthwhile, they still do not provide a robust and specific indication of what ICT capability might look like. Hence, within the context of school-based ICT, Crawford (2001) identified a useful starting list of factors that contribute to ICT capability. He indicates that pupils are likely to be considered ICT capable if they can:

> Use ICT to support their learning in all subjects
> Use common ICT tools
> Take responsibility for their own learning, developing strategies to help them learn how to use unfamiliar ICT tools, and work collaboratively
> Use current ICT hardware and software and understand its potential and limitations
> Understand that using ICT affects social processes
> (Crawford, 2001, p. 3)

Although, by his own admission, capability, particularly in ICT is likely to be a dynamic and changing phenomena and hence often difficult to pin down with sustained accuracy (2001, p. 3). Lankshear. Peters and Knobel (2000) also recognise how changing notions of 'knowledge' in a digital age challenge concepts of 'what it is to know' and hence what it is to be able to act upon that knowledge.

Over the past decade the literature has established many definitions of ICT capability, including:
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> The education system is exhorted to provide all students with the computer competence they need to be functional members of the expected new information society.
> (Magrass and Upchurch, 1988, p. 8)

> It's not just about doing, but also about being able to use things effectively and knowing why.  They key to all of this is the knowledge and understanding.
> (ACITT, 2002).

One of the most useful definitions of ICT capability is proposed by Kennewell et al (2000).  They suggest that it comprises five key components:

> Basic skills or routines such as how to use a mouse are learned by direct instruction and repetition.
> Techniques that require the student to think about how to achieve a specific outcome.
> Processes where techniques are combined to produce deliverable outcomes.
> Key concepts that students need to know in order to interact effectively with ICT.
> Higher order skills and knowledge where students demonstrate understanding of what they are doing.
> (Kennewell et al, 2000, p. 5)

In echoes of Stephenson's (1998) definition, Kennewell et al (2000) also propose that capability requires the ability to deal with the unexpected or unknown:

> Implies a capacity or power to act in as yet undefined situations, defining itself through its potential for application.
> (Kennewell et al, 2000, p. 8)

Also, that capability is a combination of a range of characteristics and behaviours:

> ICT capability therefore involves an interaction between technical facts and processes, strategic knowledge, meta-cognitive self-knowledge and effective aspects of mind including self-confidence and a disposition to use the technology.
> (Kennewell et al, 2000, p. 19)

It is clear from these definitions that capability implies that students should be able to apply knowledge learned in one situation to other, similar situations. This is not possible if they have only engaged with the technology by copying a teacher's demonstration or completing sequential tasks on a worksheet. Students need to develop confidence and independence so that when faced with a new context or software, they have the ability and willingness to explore in an informed and purposeful manner rather than giving up and asking their teacher what to do next.

Capability requires a certain level of skills, but there is much more to it than simply knowing how to use a range of functions in computer applications. Indeed, it is not necessary to have high technical skills in ICT applications in order to have high capability in ICT. It is possible to design complex systems without having the skills to implement them. However, it is not possible to produce excellent, user-orientated systems just because one knows a lot of techniques unless one has the capability to know how and why these techniques can be used effectively. Therefore, when assessing capability, it is possible for a student to attain a high National Curriculum level even if their implemented system contains flaws, so long as the student is able to identify those problems and explain what the system is supposed to do:

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It is a feature of ICT that you do not have to learn techniques fully before they can be used …
(Kennewell et al, 2003, p. 23)

Notwithstanding this assertion, the debate between skills and capability in terms of teaching and learning still continues as identified by a discussion summarised in the Journal ACITT in 2003 where correspondents summarised the debate between the importance of the acquisitions of ICT skills and the acquisition of knowledge about concepts and deeper understanding.

Loveless and Ellis (2001) assert that the need to construct knowledge from information requires more than the ability to use ICT skills and techniques. They define information literacy as being:

… the ability to question, access, interpret, amend, construct and communicate meaning from information.
(Loveless and Ellis, 2001, p. 67)

For example, most secondary students know how to use the Internet. They have the skills to use web browsers and search engines. However, they often use the Internet ineffectively and tend to be poor at identifying reliable and useful information. They are too often content to use a single source without questioning its validity. In other words they lack the capability to use the internet effectively (Graham and Takis Metaxas, 2003).

Potter and Darbyshire (2005) have developed the work done by Kennewell at al (2000). They suggest that:

… it is the mix of techniques, routines, concepts, processes and higher order skills that, together, make for ICT capability.
(Potter and Derbyshire, 2005, p. 23)

This is a useful contribution in that it proposes the notion that advancement in ICT capability takes place through parallel progression rather than a sequential progression through the key stages. Thus, students should be expected to attain some higher order skills as early as KS1 and that even at KS4, students will still be learning basic techniques.

Before the publication of the *Key Stage 3 Strategy for ICT* in 2003, Gareth Mills of the QCA produced the following diagram to represent knowledge and capability in ICT:

ICT techniques and facts

*I can cut and paste, crop a picture, create a mail-merge*

We are seeking to teach, develop and assess ICT capability.

ICT concepts

ICT process skills

*Fitness for purpose: Understanding and apply common form and conventions, Audience needs,*
*Classification and structure: Understanding that information can be classified, sorted, searched using criteria. That information needs to be organised and structured systematically.*

Use ICT to find and use information. - pupils identify what information is required for a task, search and select information, making judgements about the usefulness *of information*

Figure 1 – Understanding Standards – What is ICT Capability? (Mills, 2003)

This diagram suggests that a typology of ICT knowledge exists in 3 separate domains which join together and the intersection of all 3 domains represents ICT capability.

The diagram has the advantage of being relatively easy to understand. It is visually engaging and uses a diagrammatic convention that has been in existence for some time. The notion that 3 domains of (essentially) different types of knowledge about ICT can combine in a way that allows us to indicate an area of intersection that we can then call 'ICT capability' is appealing both visually and intellectually.

However, despite this appeal, the model presents us with more questions than it does answers. For example, if the intersection of all 3 domains is where ICT capability is found, how would we define the intersections formed by the joining of 2 out of the 3 domains? Does the ability to combine ICT concepts and ICT process skills (and so on) not represent capability in some form? Indeed, does the possession of elements of any one of the types of knowledge identified in the 3 domains represent ICT capability as well? Hence I wonder if this representation is as useful as it might first appear.

Furthermore, the definition of the domains provides some difficulties. For example, there are questions as to whether 'Fitness for Purpose' is an ICT Concept, or is it a concept belonging to some other domain of knowledge – perhaps in the area of communication skills? Also, is it true to say that making judgements about information are process skills in ICT? I think that greater precision over the definition of terms is needed before using this model as a representation of ICT knowledge.

This leads to the question as to whether or not knowledge can be appropriately represented by a '3 circle' diagram at all. Why are there only 3 circles? Why not 4 or 5 or more? Bloom (1956) provides an alternative view of knowledge in the famous taxonomy diagram:

Figure 2 – Taxonomy of Cognitive Domain (Bloom, 1956)

Evaluation

Synthesis

Analysis

Application

Comprehension

Knowledge
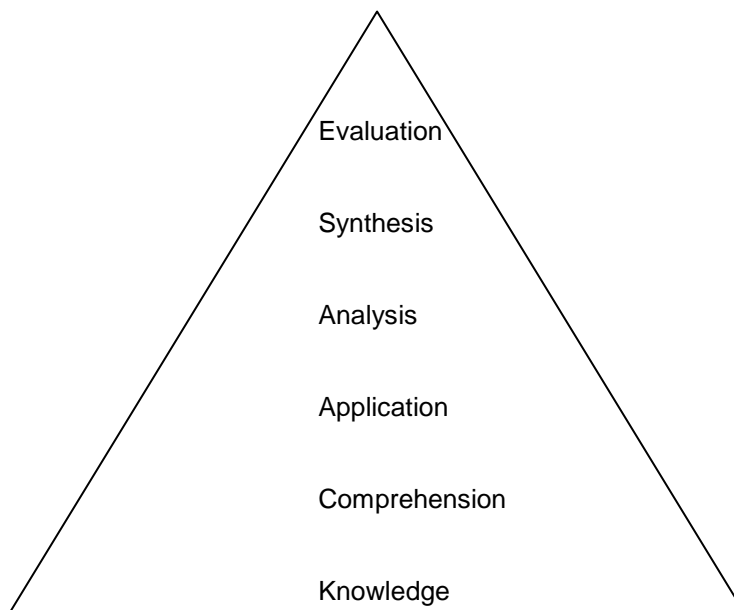
Even though it is not specific to ICT, is this a better representation? One difficulty with pyramidal structures such as Bloom's taxonomy is that it appears that in order get to the top of the pyramid, you need to start from the bottom and work up. Each higher level is seen as dependent on the former and you can't jump straight to the top without working systematically through each of the levels in turn. Is ICT knowledge (or perhaps any other kind of knowledge) always like that? Sometimes you can skip levels without any apparent loss of capability, and as Potter and Derbyshire (2005) suggest perhaps progression operates in a parallel rather than a sequential manner.

Perhaps the problem is that universal diagrammatic structures are unlikely to provide a complete representation of knowledge. Somekh (2004) considered this in the ImpaCT2 study where she asked children to draw individual mind-maps of their own ICT knowledge. The results are powerful indicators of what those children understand about ICT, but they do not provide a universal representation of ICT knowledge that we can apply to all. Perhaps the difficulty lies in the fact that the domain of ICT knowledge is constantly shifting as technology changes and develops. Hence, although diagrammatic representations of

ICT Capability may not be universally applicable or generalisable, they may prove to be a useful starting point for further discussion and development.

In a similar way, Quellmalz and Kozma (2003) have produced a typology of cognitive demands in ICT knowledge. They identify:

> … declarative knowledge of factual information – 'knowing what'; .. procedural knowledge of routines – 'knowing how'; and .. schematic and strategic knowledge – 'knowing when and why.
> (Quellmalz. and Kozma, 2003, p. 394).

This seems to be a useful and useable typology within which to consider the nature of a child's capability in ICT. Quellmalz and Kozma indicate that it is the schematic and strategic knowledge that represents the most sophisticated and demanding use of ICT tools, although it has traditionally been the area least well assessed. They talk of this aspect of cognitive demand being to do with organising knowledge, solving problems and evaluating and critiques own and others work. This has an interesting resonance with concepts that are inherent with the KS3 ICT Strategy material published by the DfES. In this material there is much emphasis placed on evaluating work, and providing strategies for solving problems (DfES, 2002a).

If we consider each of these types of knowledge in turn, does this tell us anything about the nature of knowledge about ICT and how individuals acquire that knowledge?

Declarative knowledge concerns itself with 'knowing what'. So a user of IT tools might know that clicking on a particular icon has a specific effect. As an example, clicking on the icon that looks like a floppy disk in MS Word© will cause the document that is currently being used to be saved. As this is declarative knowledge, it is immaterial as to whether or not the user has any inkling about the way in which the document is saved; the most important thing is recognising that the action causes an effect. At the declarative level, there is an association formed between an action and the effect that results from that action. As software applications have developed over the past 20 years, much emphasis has been placed on designing an intuitive interface for the software. This has direct linkage to knowledge in the declarative domain. Developers have realised that once users have formed the association between action and result, it is very difficult for them to associate another action with the same result, or a different result with the same action. So, common interface standards such as the icons which MS Office© uses have been developed so that software that is handling data in very different ways looks similar in a number of aspects. Hence the time taken to learn how to use the software in a declarative sense – recognising icons, menu items etc. is considerably reduced. In this sense, declarative knowledge gained in one application can be beneficial to the use of another. The knowledge can be transferred to a different context and still be useful. This knowledge is also long lasting in that the associations that are formed early in a user's experience of IT can persist for many years. For example, MS Word still contains help screens for WordPerfect© users, that is for people migrating from another manufacturer's application. The help system in this context identifies Graphical User Interface alternatives (Word) to Command Line Interface interactions (WordPerfect) – icons that replace key press combinations. All this for an application (WordPerfect) that has long ago ceased to be marketed. In a similar way, the iconic associations can be so well established that the graphical trigger (the icon) can be

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represented by an image that is now becoming obsolete. For example, the icon to save work is represented in many applications by an image of a floppy disk. Floppy disks are rapidly becoming obsolete storage devices as the technology introduces alternatives such as writable CD-ROMs, flash drives and other portable storage media. It is almost certain that if the interface was to be designed today, the floppy disk icon would not be used. Given the strength of the association between that icon and the effect of saving work, it is difficult to see how the icon will ever be changed.

However, declarative knowledge alone is not enough to ensure that someone is a capable user of IT. Knowledge at this level (when it is at this level only) can be problematic. For instance when a user saves work without an understanding of the process – particularly where the work is saved, they may not be able to find the document again. This is a problem that often surfaces in schools when pupils are saving work to networked computer systems, without any conceptual knowledge about the structure of the filing system.

Procedural Knowledge is concerned with 'knowing how'. So, for example a user of a spreadsheet application might know how to create a formula to add up a range of numbers in the current sheet. This type of knowledge is largely specific to a particular application. So, for example, knowing how to create a formula in a spreadsheet does not necessarily provide the user with the knowledge to create a table in a word processing application. It is true that many applications in current use now conform to a common interface standard, so that knowledge acquired through one application can be transferred to another. For instance the knowledge of how to save a document in a word processing application is transferable to other applications such as spreadsheets or graphics packages. The move towards common interface standards over the past 20 years or so has certainly helped with transferability, but, common interface standards do not guarantee transferability. The common interface tends to cover frequently used processes such as saving or printing a file. The more specific processes concerned with the detail of a particular software package are often not transferable between different applications, and, indeed may not be even transferable between the same type of application from a different manufacturer. So, procedural knowledge would suggest that the user has enough knowledge of how particular software packages work to enable them to carry out the tasks they are undertaking. The greater their procedural knowledge across a range of software, the more likely they are to be able to perform the task in any given situation. Perhaps procedural knowledge is a key component of transferability and hence ICT capability. However, there is a problem in that no one individual could hope to know all that there is to know about every piece of software they are likely to encounter. This is particularly true for ICT teachers in school. Hence there is a strong imperative placed upon ICT teachers to keep their knowledge up to date and also to familiarise themselves with the software that is relevant to teaching the curriculum.

Implicit in Quellmalz and Kozma's article is the hierarchical nature of this typology. Schematic and strategic knowledge represents knowledge at a higher level than declarative or procedural knowledge. Does that then mean that progression to the higher level of use of ICT in these terms depends on having mastered the lower levels first? On the face of it, it would appear that this is the case. The successful organising of knowledge, solving of problems and evaluation of outcomes in respect of the use of ICT tools will be

determined by the extent to which the student has already developed declarative and procedural knowledge in the subject. This may imply that to demonstrate 'capability', a computer user has to have 'mastered' all three levels of Quellmalz and Kozma's typology. As anyone who has inefficiently 'muddled' their way through the early encounters with a new piece of software will testify, it is not necessary to be fully conversant with the declarative and procedural features of the application in order to generate a product. Indeed, as implied by Kennewell et al (2003) sometimes the naïve and unsophisticated exploration of a software package can be more enlightening than following a route of training in the software that has been prescribed by someone else. Also, by interacting with the software with the aim of using the tool to support schematic or strategic knowledge activity, the student may learn a lot about the declarative and procedural features of the software at the same time, albeit at the expense of efficiency and economy of effort. Hence there may be some doubt about the order in which these varying types of knowledge are acquired.

Pearson (2005) adopts the term 'futzing' to define his observations of pupil interaction with technology tools that are unfamiliar. The Americanism 'futzing' has a number of definitions. For some it is pointless, unproductive tinkering, for others it is amateurish meddling. In the programming community futzing is often used as a disparaging term for re-coding without any purpose. However, the definition provided by the website 'whatis.com' defines futzing as:

> … unstructured, playful, often experimental interaction between a human being and a computer, product, or any technology, sometimes but not always with a productive purpose in mind. Futzing can be pure play, learning by trying, or an attempt to achieve breakthrough insights.
> ([www.whatis.com](www.whatis.com), 2010)

Of particular note is the 'learning by trying' element in this definition as this seems to encapsulate how many people learn to use computer technology and software and find resonance with Quellmalz and Kozma's notions of the building of schematic and strategic knowledge.

> The capable computer user has an ability to adapt to change, employs self-directed learning strategies, has a willingness to experiment, recognises appropriate avenues for integration and is prepared to persevere.
> (Phelps, Hase and Ellis, 2005, p. 70).

This idea finds some resonance in the recent review of adults learning to use computers carried out by Selwyn and Gorard (2004) who note that:

> … self-education was, more often than not, expressed in the interviews in more mundane, haphazard terms of 'getting by' and 'muddling along.
> (Selwyn and Gorard, 2004, p.26)

However, Selwyn and Gorard stress the importance of mediation in the process. Their findings illustrate that learning to use a computer is seldom a solitary exercise, but it is mediated by colleagues, family members, friends and other parties including informal networks.

Doolittle (2000) has devised a model of learning he calls 'complex constructivism' which is based on constructivist theories that he has then refined to include elements of complexity theory. His aim is to produce:

> A perspective that emphasizes both the active, self-organizing construction of knowledge, and the adaptive nature of those constructions.
> (Doolittle, 2000, p.15).

This has been taken forward by Phelps, Hase and Ellis (2005) who have developed a model to conceptualised computer education. They state:

> … students and teachers bring to the learning environment a wide mix of variables, and the unpredictability of these variables is the rule rather than the exception. Foundational to complex thinking about education is the notion that teaching does not necessarily cause learning and learning cannot be pre-determined or 'caused' (in linear terms) by teaching.
> (Phelps, Hase and Ellis, 2005, p.74)

Hence when Pearson (2005) illustrates the 'futzing' process at work when a student's seemingly unfocused computer use:

> … had moved her work forward, but this had been done in her own time and on her own terms.
> (Pearson, 2005, p.11)

We are seeing a practical illustration of 'self construction of knowledge' (Doolittle 2000. p. 15) and adaptation of experience. Learning has taken place for this child, but in a way that is unpredictable and non-linear.

As Pearson (2005) acknowledges, it is tempting in a classroom to see pupil activity that is not consistently and constantly moving the child forward to completion of the task in hand as non-purposeful and thus behaviour that should be discouraged or even sanctioned. However as this discussion seeks to indicate, for some pupils, non-purposeful 'playing' with the technology can have an unpredictable learning consequence. As they construct their own understanding (in a non-linear manner), their understanding of and capability with technology can be moving forward. For many children use of ICT at school is sharply contrasted with their experience of using computers outside of school. As Holderness noted:

> … the people who are at home with technology are those who have not forgotten how to play.
> (Holderness, 1994)

Children develop many elements of ICT capability outside the classroom and, in many cases, this development occurs in informal settings (McDougal and Boyle, 2004, p. 111). Hence it is not surprising that children use these less formal methods to develop understanding within the classroom as well. For teachers, the challenge is to determine which pupils are genuinely exploring alternatives as a means of constructing their own understanding and those who are just wasting time. As Hammond (2004, p. 37) notes what looks like 'off-task' behaviour may not really be 'off-task' at all.

Often, in an ICT classroom session, this kind of unstructured exploration of technology is discouraged. Pupils are often 'trained' to pursue a particular path of learning (usually defined by the teacher). The use of
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pedagogical techniques such as teacher demonstration followed by pupil practice often limits the opportunities the pupil has to explore the software tool in depth. When pupils do explore the tool in their own way, teachers often constrain the amount of time allowed for this type of activity on the grounds that is it unfocused or off task. Pearson suggests that this unstructured exploration has much more value than many teachers acknowledge in that it is encouraging the pupil to discover for themselves what the software tool is doing and can do. In Quellmalz and Kozma's terms, the pupils are developing their schematic and strategic knowledge of the technology.

This discussion highlights Hadjerroiut's (2009, p.156) point that there is no common agreement about ICT knowledge and what constitutes ICT Capability. The problem is that if there is no definition or representation of ICT capability and knowledge in a form that is applicable and valid for all pupils and fully understood by all teachers, how can teachers hope to assess ICT capability effectively in school?

Notwithstanding the lack of a universally accepted definition of ICT capability, some measure of confidence in the assessment practices of schools could be obtained if schools were using theoretically sound and consistent methods to assess their pupils. The next section outlines some of the theoretical issues relating to assessment methods and their application in schools.

## *The Methods of Assessment Used*

In order to evaluate ICT Assessment in practice, it is necessary to explore conceptual issues in assessment. Rowntree (1977 p. 119) noted 8 conflicting or contrasting modes of assessment that provide a useful framework within which to consider how assessment is actually carried out in practice. As a summary and simplification of Rowntree's discussion, formal assessment is compared to informal assessment where opportunities for assessing are contrived (formal) rather than naturally occurring (informal). Formative assessment is identified as a diagnostic and developmental activity; whereas summative assessment is seen more as a measurement of some kind of attainment at a particular time – although Rowntree acknowledges that the distinction between formative and summative assessment events is not always easy to establish. Terminal assessment activity carried out at the end of a course or module is contrasted with continuous assessment throughout the course or module. In a similar fashion, assessment by course-work is usually seen as a form of continuous assessment; whereas assessment by examination is usually a terminal assessment event. The assessment of process rather than product is considered where process is identified as the means by which product is created. Rowntree notes that whilst the learning process is 'awash with process' Rowntree (1997, p. 138), the product created is more often used for assessment purposes. The use of an external assessor such as an external examiner or moderator is contrasted with a teacher carrying out internal assessment within the classroom. Borrowing a phrase from Hudson (1996), Rowntree establishes the difference between convergent assessment (that for which there is one correct answer) and divergent assessment (where many answers could be construed as correct). Finally, the ideographic use of assessment focusing on the individual pupil is contrasted with the nomothetic assessment which is more concerned with generalisation about groups of pupils.

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The terms established by Rowntree will be used in the discussion below to 'anchor' the points being made to a fundamental contrast between various methods used in the assessment process, starting with a consideration of how assessment methods often concentrate on assessing a product of learning rather than the process which gave rise to the product.

## The Assessment of Process or Product

Questions of validity of the assessment instrument are never far from the surface when considering how assessment is being carried out. This is particular true of the discussion relating to any decision to assess the product of learning or the process of learning. There is a real danger that assessment gives value to that which it assesses, and the easier a thing is to assess in practice, the more value it acquires. Biggs (1992) notes:

> … institutions exert pressures on teachers, almost always in a quantitative direction. Teachers then tend to set assessment tasks the demands of which can be met by using low level processing. Students in turn use assessment-focused, quantitative forms of understanding, and surface approaches to learning in order to match those forms.
> Biggs (1992, p. 9)

Rowntree (1977 p. 119) suggests, tangible products that are outputs of a student's work are easier to assess than the process by which the work was produced because the products exist and can be stored, rather than being transient and difficult to capture. This has led to a traditional emphasis on the production of a piece of work that can be marked and, if necessary, returned to later – perhaps as part of a moderation exercise to ensure consistency of assessment between different markers. Hence, using the paraphrase of Rowntree's terms established above, assessment of product is usually a terminal, summative, formal event. It may also be external, examined and nomothetic. The notions of output are also often enshrined in criterion-referenced course specifications and also even in the National Curriculum for ICT where appropriate 'products' indicating pupil attainment are identified. Throughout the whole school curriculum, there has been a traditional emphasis on output as a means of indicating a pupil's progress, understanding or attainment. In an ICT context, this has often resulted in a printed copy of work that the student has completed, or, more recently the collection of an electronic version of work that the student has saved. This model requires inferences to be made from the product evidence about the processes which gave rise to them. Unfortunately, unlike some other curriculum subjects the notion of explaining the process that the pupils undertook (either through showing working out, or through some other form of explanation of decision making) is not yet well established within the ICT subject domain. Hence too often the product evidence alone tells the assessor little about the process unless the assessor has observed the process take place. In 2007 Freedman noted:

> ICT, however you choose to define it, is a process that leads to a product. So, if you assess only the end product, you miss a crucial component of the whole thing.
> (Freedman, 2007, p. 1)

This is particularly the case when the end product is a complex synthesis of a number of differing processes for example a spreadsheet model. One solution to this difficulty would be to constrain the activity to

predictable, small scale tasks that have limited opportunities for deviation from a specific solution. Unfortunately, the inevitable reduction of assessment to measureable, but largely trivial, activities was recognised by Popham (1984) which, he stated, leads to assessors:

> … pruning the nature of the measured behaviour so that we're assessing ever more trifling sorts of behaviour.
> (Popham, 1984, p. 39)

The widespread use of worksheets in the teaching of ICT could be seen as a means of teachers attempting to produce output from pupils that is easily assessed in this way.

In the domain of ICT knowledge, trivial activities such as pressing particular keys to generate an action in a computer application are relatively easy to measure. However, as has already been determined, such low-level skills are only a small part of what could be described as ICT capability. In a study of Swedish schools Jedeskog and Nissen (2004) note how ICT as a subject can be particularly prone to product oriented teaching. In ICT, there has in schools, been a traditional emphasis on skills teaching and assessment. It is both easy to teach (through drill and practice exercises) and easy to assess. Unfortunately in terms of assessing capability these types of assessment tell us very little. Talking about the assessment of NC Levels and how a process of aggregation is implicit in the requirement to produce a single Level of Attainment at the end of a KS, Sainsbury (1994) identifies:

> Within a criterion-referenced system such as this, there are important questions about what constitutes 'mastery' at a given Level. Should all the statements be attained? Each more than once? Or should some allowance be made for careless mistakes or inconsistent performance?
> (Sainsbury, 1994, p. 7)

This highlights how the composition of the NC assessment process, whilst intended to provide teachers with a more consistent and reliable set of criteria against which to assess their pupils, has actually created assessment dilemmas for teachers in terms of making summative judgements at particular stages of a child's education. In order to address these dilemmas, teachers resort to product oriented assessment because it is both easier to administer and also easier to measure.

Brooks (2002, p. 1) acknowledges that teachers, particularly beginning teachers, see assessment as a 'terminal event' that marks the end of a task or aspect of work rather than an integral element of teaching. Assessment becomes an end point, and sometimes an end in itself and this assumes a particular purpose as a summative instrument for identifying particular performance at a point in time. From Brooks' perspective this is a limitation of the potential for assessment to be embedded within the pedagogy of the teacher and used to inform and develop as well as record time specific performance or attainment.

It is quite easy to see the attractions of assessment of product and ICT is by no means isolated in the school curriculum in its traditional reliance on assessment of completed output. For example, marking can be done after the class; a record of that mark can be kept in a mark book; some measure of consistency is possible if all students are completing the same piece of work. However, it is also evident that for some students, the

completion of a product may mask their ability or level of performance in the subject. For example, the student who perhaps spends a long time on completing a piece of work, learning much in the process, but for some reason does not complete the process of saving the product or printing it out is disadvantaged by this approach. Zoellner (1969) reflects on the difficulties for the student who knows what he wants to say, but can't write it down and the course tutor, who is trying to understand what has been written down. Salmon (1998) agrees:

> … the emphasis on product rather than process necessarily entails individualised testing, and precludes the oral modes and group settings that can provide the opportunity for the display of thought in action.
> (Salmon, 1998, p. 62)

On the other hand, assessment of process is difficult to achieve. As Nunes (2003) acknowledges:

> … there is the challenge of establishing a relation between, on the one hand, the steps and procedures used in solving a problem and, on the other hand, the skills, competencies and command over the content involved.
> (Nunes, 2003, p. 376)

Assessment of process often relies on direct interaction between student and teacher and a level of sophistication in the teacher's practice (particularly in relation to questioning technique) in order to be successful. Some of the recent emphasis on the use of pupil-pupil or pupil-teacher interaction identified in the Assessment for Learning Strategy can encourage more articulation on the part of the pupil of the process they have been undertaking, and this technique certainly has potential in providing the teacher with the opportunity for assessing process (in Quellmalz and Kozma's terms), (there will be further discussion of the use of Assessment for Learning techniques below). However, Wragg (2001) notes:

> Most of teachers' questions about subject matter, as opposed to management issues, are designed to check knowledge and understanding, often asking for facts, or diagnosing pupils' difficulties.
> (Wragg, 2001, p. 32)

Even in situations where teachers are aware of the benefits of assessing both product and process, they can still easily miss the point in terms of assessment of schematic and strategic knowledge (as defined by Quellmalz and Kozma). For example, the pupil who spends the whole lesson changing fonts in a word processed document could be seen to be wasting time, or they could actually be developing a greater understanding of the way in which word processing applications handle fonts when they then transfer to and/or compare with their understanding of the way in which other applications handle fonts. Few teachers would see the activities of this pupil as productive, yet there may be more going on in terms of the development of capability of this pupil than is immediately obvious. One relatively recent development in English education which attempts to capture routine pupil actions and activity in order to develop their learning further is the introduction of Assessment for Learning methods.

## Assessment for Learning (AfL)

Within the English educational system over the last decade there has been a growing concentration on the use of assessment judgements as a means of guiding pupils' progress and development. This approach has come to be termed formative assessment (or formative evaluation in American usage), following terminology first introduced by Scriven (1967); although the approach has a longer pedigree and the idea of using assessment tools to enhance learning rather than to make a final judgement can be traced back to the work of Vygotsky and Dewey. In the English system, the current emphasis on formative uses of assessment has been largely initiated by the work of Black and Wiliam in their 1998 paper 'Inside the Black Box' and further work by the Assessment Reform Group. This approach is grounded in what Berger and Luckman (1967) identify as a 'constructivist' epistemology. In educational terms this is typified by a vision of learning and teaching based on handing more control of learning over to learners and then supporting learning by teaching that is designed to acknowledge individual learner's needs and provide opportunities for learners to meet those needs. Consequently, within the framework of terminology established for this discussion, AfL techniques are mainly concerned with informal, formative, continuous and ideographic assessment methods. They are also most likely to be internal to the classroom. As a result of Black and Wiliam and other work, the National Key Stage 3 Strategy in England first introduced the theme of Assessment for Learning into English Secondary Schools in 2003. The term Assessment for Learning is meant to distinguish this approach from Assessment of Learning which is in Scriven's (1967) terms a more traditional 'summative' or final judgement assessment approach. Since the introduction of AfL into schools in 2003, schools have been much more aware of the potential uses of assessment evidence as a tool to enhance pupil performance and progress. However, as indicated by Coombs and McKenna (2008) and Popham (2006) the evidence of the adoption of AfL techniques has been patchy. Also as Marshall and Drummond acknowledge there is a:

> … very real difficulty of transforming AfL procedures or strategies into classroom cultures that promote pupil autonomy.
> (Marshall and Drummond, 2006, p. 5)

Consequently, in the light of a complete failure of the testing regime for the end of Key Stage 3 tests in 2008, and recognising this perceived weakness in the application of AfL methods in school, the DCSF published the Assessment for Learning Strategy in 2008 which, for the first time, formalised the use of AfL in English schools and supported this with funding and a strategic plan.

Despite the increasing emphasis on the potential provided by formative uses of assessment, the summative use of assessment evidence has continued. End of Key Stage tests and assessments are still statutory in England at Key Stages 1 and 2 and records of individual pupil attainment levels against the NC attainment targets are still published under statutory orders at Key Stage 3. Also the public examination system at Key Stage 4 and above has, if anything, entrenched itself in the summative uses of assessment after a series of well publicised criticisms of the use of coursework over the past few years, including a 2005 QCA report stating that coursework lacked validity (QCA, 2005a). Skidmore (2003) acknowledges the detrimental effect this type of debate can have on the whole examination system, whether or not there is any foundation to the publicity. Billington and Taylor (2008) concur in that they have identified some initial findings that seem to affirm the influence of media criticism on public trust in educational assessment mechanisms.

To a certain extent, opinions and attitudes about assessment have polarised with formative assessment being seen to be wholly positive, whilst summative assessment is seen to be wholly negative. As Taras (2005) indicates, a growing mistrust and scepticism over the use of summative assessment has encouraged misconception against it. This comment by Boud (2000) illustrates this attitude:

> … summative assessment acts as a device to inhibit many features of a learning society.
> (Boud, 2000, p. 155)

Yet Taras would also contend that all assessment has a summative element to it:

> … it is not possible for assessment to be uniquely formative without the summative judgement having preceded it.
> (Taras, 2005, p. 468)

As she goes on to elaborate, there is a real danger that the practice of formative assessment and that of summative assessment are seen to be mutually exclusive as identified by Hargreeaves (2005). However, in its 2002 publication, the *Formative Use of Summative Assessment*, the then DfES clearly acknowledged the contribution that summative assessment techniques can make to AfL (DfES, 2002b).

It is difficult to find criticism of the philosophical approach taken by AfL. Hargreaves (2005) indicates that the teachers she surveyed in her research have a limited conception of what assessment and learning mean in practise. James and Pedder (2006) suggest that teacher commitment to the values and practise of assessment for learning is key to its success; but they also identify a number of constraints to this process. Marshall and Drummond (2006) highlight a large number of lessons that incorporate a literal use of AfL tools and techniques without embracing the spirit of AfL. However, these studies limit their focus largely on the practise and use of AfL tools and techniques. Taras (2007) comes closest to a critique of the underpinning philosophy of AfL, but her conclusion is not that the underpinning philosophy is incorrect, but that the manner in which the philosophy has been incorporated into practice needs to be refocused. She implies that a continued concentration on formative assessment processes at the expense of any summative process could lead to a whole scale undermining of the existing mechanisms that rely on some element of summative assessment.

At the same time as the growing use of AfL methods in the classroom, schools have also found themselves increasingly accountable for their performance through their published assessment results. This has generated a body of literature relating to the 'high stakes' nature of assessment when used as a mechanism for accountability.

## High Stakes Assessment

The term 'high stakes assessment' has come to symbolise the traditional emphasis on terminal, externally examined, formal, convergent assessment mechanisms by the school community. According to Tapper (1997):

Large-scale policy-driven evaluations are largely distinguished from instructionally relevant, formative evaluations by their very nature. Policy-driven measurements are, without exception, imposed upon students, schools and school systems. Such summative evaluations are not concerned with exploring the deep-processing and ultimately meaningful understanding of the examinee, but rather by their very nature examine more easily quantifiable and generalisable constructs.
(Tapper, 1997, p. 5)

This type of assessment is seen as 'high stakes' because the assessment carries value such as an end of course grade, GCSE or A Level result, or a Key Stage 3 Level. Thus the assessment is 'high stakes' for the individual pupil (it is their grade or mark), but also for the school. However, Stobart (2001) indicates that:

… the consequences for the pupils in these high-stakes assessments are limited, but for schools, LEAs and government they are highly significant.
(Stobart, 2001, p. 31)

Thus the nomothetic aspect of this assessment becomes a 'yardstick' against which to measure the school. The latter is due to the use of aggregated school grades and levels in school league tables. In this context, the individual performance of the pupil assumes an importance beyond that of the personal in that it contributes to the overall standing and status of the school – particularly in comparison with other schools.

Although accountability was but one facet of the five original assessment purposes set out by the Task Group on Assessment and Testing in 1988; by the mid 1990's, according to Whetton (2004) the balance of assessment of NC attainment had shifted significantly towards manageability and accountability at the expense of authenticity in terms of the curriculum aims. At the same time in the mid 1990's the Government placed a requirement upon schools to publish their results, initially in the secondary sector with GCSE results, but followed soon after by a requirement to publish all results of national tests and examinations from KS2 statutory testing through to post-16 examinations. Hence, by the end of the 20th century, school accountability was major attribute of the assessment system within the English school system and high-stakes assessment was embedded within the practice of schools across all phases of compulsory education.

According to a statement issued by the major teaching unions (2005, p. 2) high stakes assessment leads to '…a narrowing of curriculum coverage in order to focus on those subjects tested.' Brooks (2002, p. 158) also indicates how a high stakes testing regime is, in her terms, 'incentivising' schools to alter their pedagogical practices in order to present their pupils, and ultimately the school in the best possible light. Brooks expresses concern at this can lead to a policy of playing safe which results in lack of challenge for some pupils. Others, notably Harlen and Deakin Crick (2002 and 2003) identify how high stakes assessment can lead to teachers teaching to the test and how this then distorts time allocated to the programme of study and undermines the aims of the curriculum as a whole.

High stakes tests can become the rationale for all that is done in classrooms and permeates teachers' own assessment interactions.
(Harlen and Deakin Crick, 2002, p. 62)

Snow (1990, p. 435) refers to this as the 'backwash effect' of assessment where students concentrate only on those elements of the curriculum that are to be assessed, and, in response, teachers only teach the elements of the curriculum that are likely to appear in tests. It would be easy to characterise this phenomena as applicable to summative assessment only as 'teaching to the test' has an obvious relevance to summatively assessed learning. However, even in formative assessment structures, as indicated by Biggs (1992), whatever the prevailing philosophy of assessment may be, it is always easier to assess low level behaviours or attributes, and thus these behaviours and attributes become the central driver of the curriculum.

As a consequence of the statutory requirement to report end of Key Stage 3 assessment levels of individual pupils in schools in England, it will be important to determine in this research how the publication of the results of assessment at the end of KS3, influences the ICT curriculum that is delivered.

Accountability depends to a large extent on the ability to apply some form of measurement on the outcomes of assessment. Yet, in the classroom, teachers routinely use their experience and intuition to assess pupils. By its very nature, intuition is rarely measureable, but in order to recognise intuitive methods of assessment if they are encountered in this research, it is necessary to give some consideration to how these intuitive methods might be used by teachers.

## The Use of Intuition in Assessment

Rationalism and scientific method have traditionally eschewed the value of intuitive judgements in favour of quantitative measurement, yet teaching is often an intuitive process. Bruner (1962) devotes a chapter to consideration of the relationship between intuition and learning and teaching. Although Sadler (1989 p.131) warns of the '… limitations in human information processing capacities which result in biased or defective decisions.'

More recently Waks (2008) indicates:

> Each educator is presented from minute to minute with information-rich circumstances, under various institutional constraints, which present innumerable opportunities for generating both general and specific educational value. Whether or not novice teachers begin with good natural instincts, they, … , lack rich experience "frozen into habit," indexed and cross-referenced in long term memory. … Experienced teachers, on the other hand, …, have a rich body of experience which guides them in scanning their immediate circumstances for opportunities and then rapidly and flexibly responding without the explicit mediation of consciousness to generate educational value. When they are relatively free of institutional constraint, their work can exhibit intuition.
> (Waks, 2008, p. 7)

In highlighting the value of experience, Waks suggests that intuitive judgements can become second nature in what is often termed 'unconscious competence' on the part of the teacher. However, Cooper's (1981) article *Ubiquitous Halo* illustrates in considerable detail how when making judgements based on judgement (rather than measurable criteria) assessors lose detail and add beliefs or impressions (Cooper, 1981, p. 220). In contrast, Wells, (1999) exemplifies the value of teacher judgement that uses dialogue and

engagement with pupils within a socio-cultural context where intuition, in terms of knowing the best ways to encourage and facilitate conversation between teacher and pupil, can enable the teacher to discover what a pupil really knows and has learnt. Similarly Mercer (1995) recognises the central place of conversation within the educational domain, and its importance in the process of assessment.

Teachers often make intuitive judgements about pupils and their work arising from informal ideographic assessment. The NC assessment advice uses a notion of 'best fit', where teachers are advised to use their judgement to determine where a pupil fits within the level descriptors. According to Sainsbury:

> In teacher assessment, … , there is no requirement to apply any particular rule; teachers may, if they wish, make a global, or even impressionistic assessment of a child's level.
> Sainsbury (1994, p. 7)

Whilst this judgement can be made in a mechanical manner, more often:

> ICT assessment has often relied heavily on teachers' intuition. Not confident in their own ICT abilities, many teachers have been even less confident in assessing pupils' ICT work. As a result, there have been large discrepancies in levelling ICT work in both primary and secondary schools.
> Northern Grid for Learning (2000)

The widespread use of objective testing techniques typifies an attempt to move away from subjective judgements of examiners or assessors to the point where it is possible for non-experts or even computers to mark work. There is an interesting parallel here with the intended introduction of on-line testing for ICT at the end of Key Stage 3. Although the on-test was not introduced to all schools, the pilot test was assessed by the computer and a KS3 ICT level awarded from this marking. The original intention was that the test would be adaptive, that is it would respond to pupil's responses and then ask appropriate questions based on previous responses. So, if a pupil answered a question in a way that suggested they were working above the level of this original question, a more advanced question would be asked next time. However, this adaptivity was never implemented in any of the pilot tests.

It is true that multiple-choice tests are relatively easy to mark, although it would be incorrect to assume that there is no subjectivity involved in these testing instruments. The choice of questions to ask is definitely a subjective judgement; even where the questions are chosen at random from a bank of questions, someone had to make a subjective judgement relating to which questions would be put into the bank in the first place.

Gigerenzer (2007) provides a comprehensive overview of the value of intuition and heuristic to decision making. He suggests (p. 17) that '…our education systems place value on everything but the art of intuition.' Then, like Waks (2008) he goes on to provide many examples of the value of intuition in decision making from a wide range of contexts.

However, Kruger and Dunning (1999) suggest that our self awareness is often poor; particularly in relation to our levels of skill at performing tasks or solving problems. This has implications for the use of self assessment in the classroom. If, as Kruger and Dunning suggest we are not only poor at determining our

ability, but also poor at the meta-cognitive process of recognising our lack of ability, then it is important that teachers understand this and put in place structures to develop a more effective realisation of their own abilities in their pupils. Similarly, if teachers are unaware of their own fallibility in their assessment of pupils in the classroom, then achieving a consistent and reliable assessment of those pupils in relation to their peers will be impossible.

Sadler (1989) agrees:

> … it is often difficult for teachers to describe exactly what they are looking (or hoping) for, although they may have little difficulty in recognizing a fine performance when it occurs among student responses. Teachers' conceptions of quality are typically held, largely in unarticulated form, inside their heads as tacit knowledge.
> Sadler (1989, p. 126)

Hockney, discussing a different context, agrees:

> The fact is, we see with memory, which is why none of us sees the same thing, even if we're looking at the same thing.
> Hockney, D. (2009)

The problem is that if it is difficult to define or represent ICT capability and knowledge with any degree of accuracy in a form that is applicable and valid for all pupils, how can assessment in school be reliable, consistent and valid? According to Kennewell et al (2000, p. 28), '… we do not believe there are straightforward procedures which will lead to a valid assessment of a pupil's capability.'

In a similar vein, Wolf (1993) writing in relation to criterion-based assessment in vocational education:

> The point is not that decentralised assessors cannot assess to an acceptably common standard. They can: but the process is complex, incremental and above all, judgemental.. The performance observed – directly, or in the form of artefacts – is intrinsically variable: …
> Wolf (1993, p.16)

Biggs (1995) proposed a taxonomy which he called Structured Observation of the Learning Outcome (SOLO). This taxonomy identifies a continuum of pupil performance across 5 stages: pre-structural, uni-structural, multi-structural (but independent), relational and extended abstract. The first three of these stages are assessed by quantitative measures, whilst the latter two require qualitative measures of assessment. Whilst this model may be helpful in some circumstances, the problem of reliability of qualitative judgement remains. If we were to surmise that capable pupils exhibit the latter two aspects of the taxonomy, we still cannot be certain that the qualitative elements of assessment required are reliably applied and that standards are consistent across teachers and schools.

If, as Waks (2008) suggests, the experience of teachers is important in determining the quality and reliability of their intuitive judgements, a greater maturity of teachers' involvement in the assessment process should provide greater confidence that the teachers are assessing reliably.

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## Maturity in Assessment

The quote from Waks (2008) above suggests that there is a qualitative difference between the actions and activities of novice and experienced teachers when it comes to their practice. There is no doubt a maturity at work with the experienced teacher that the novice has not yet acquired, and, in theory at least, this should also apply to the processes of assessment. If this is so, then consideration of the factors that contribute to maturity would be valuable. Maturity models have been around for some time. Humphrey (1989) in his book *Managing the Software Process* introduced the concept of a Capability Maturity Model to measure how well diverse organisations measure up against a scale of five key processes. Since then a number of other disciplines have adopted and adapted the idea behind the concept and in 2004 Underwood and Dillon (2004a) produced a model that was designed to measure the maturity of schools in relation to information technology. This model was used as part of the Impact study (completed in 2007) researching the impact that ICT was having in schools and how it was affecting pupil performance.  The extracts below are adapted from the model of Underwood and Dillon, (2004b, pp. 6 – 7).
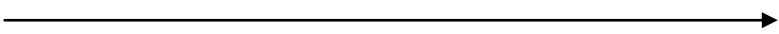
| 12. Summative Assessment | | | | |
|---|---|---|---|---|
| Less Mature                                        → More Mature | | | | |
| Assessment is confined to traditional approaches. | Some staff have more innovative approaches to assessment including the use of ICT in some of their subject teaching. Some schemes of work may include explicit ICT-based assessment activities. | Most staff have more innovative approaches to assessment including the use of ICT in some of their subject teaching. Student portfolios can be used as an alternate method of authentic assessment to track student performance Some schemes of work may include explicit ICT-based assessment activities. | There is an appropriate mix of assessments including on-line assessment to match pedagogic goals. Assignments are easily managed using online student performance tracking tools There is a collective agreement concerning the value of various assessment approaches. | There is an appropriate mix of assessments including on-line assessment to match pedagogic goals. Clear monitoring of approaches which, if deemed successful are rolled-out across the institution and are embedded in the curriculum. |

Table 1 – Maturity and Summative Assessment
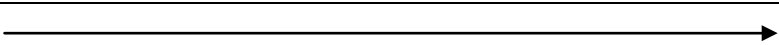
| 13. Formative Assessment in relation to ICT | | | | |
|---|---|---|---|---|
| Less Mature ⟶ | | | | More Mature |
| Formative assessments are restricted to traditional methods. Staff across the institution do not generally consider an ICT approach or the institutions systems are not sufficiently developed to conduct assessments on this way. | Some staff consider the value of ICT based assessment, although very little assessment is conducted in this way. | Formative assessment using ICT is considered by the majority of staff, although the institutions systems are not sufficiently equipped to deal with this type of assessment on a larger scale. | Most staff consider the value of using ICT to administer assessments and this is carried out on a regular basis across the institution. The institutions systems are developed sufficiently to enable this type of assessment on a regular basis, although may not be able to be used by whole classes simultaneously. | The institution is able to administer assessments using ICT as required. They have adequate ICT resources to enable them to administer assessments smoothly and as a collective group. This type of assessment is heavily incorporated into schemes of work. Children are able to monitor their own progress. |

Table 2 – Maturity and Formative Assessment

However, what this model concentrates on is how ICT is incorporated into the assessment process. Given the purpose for which it was created, this is not surprising. What is less clear is how individual teachers develop their own maturity in assessment. Is this a process that is time dependent, so that the longer a teacher has been assessing, the better they are at doing it? Given the pace of change of ICT, this may not be the case. There certainly seems to be some resonance between this model and Waks (2008) notion of a link between the experience of a teacher and their ability to use less traditional assessment techniques. It will be interesting to discover if that link exists in practice when exploring the relationship between experience and assessment techniques in school. It will also be useful to determine how schools are enabling their ICT teaching staff to develop expertise in assessment (perhaps through training events) and what impact this may have had on the practice of school ICT departments.

Wolf (1993, p. 13) recognises the 'shared meaning' and 'common experience and expertise' of teachers who routinely carry out assessment. Similarly, Kehr-Tittle (1994), identifies the benefits to the assessment process of collaboration between professionals in the field. If these phenomena can be identified within departments and schools, this could be a very positive indication of a sharing of experience and a

compensation for a lack of maturity in younger teachers involved in the assessment process. It will be important in this research to determine if such phenomena can be identified in practice.

In the next two sub-sections, two other factors relating to the security and reliability of assessment are discussed. Firstly, consideration is given to record keeping by teachers, because assessment judgements (in whatever form they are made) need to be recorded so that the teacher and pupil can return to them at a later date either for reporting purposes, or in order to highlight progress that has been made. Secondly, a brief consideration of the training of ICT teachers is provided to illustrate how ICT as a subject specialism in English schools is a relatively new phenomenon and that trained ICT specialist have only recently been employed within schools. This is important because there are still schools that use non specialist teachers to teach and hence assess ICT and in the research it will be important to discover what effect this has in practice.

## Keeping Records, Monitoring and Reporting on Pupil Progress

All teachers have a statutory obligation to report on pupil progress in their subject. This obligation requires them to report to parents at least once per year on the progress being made by the pupil, and also to provide end of KS evidence of the pupil's attainment.

There is no statutory prescription over how records are to be kept, and so schools and departments devise their own methods of keeping records.

According to Brooks (2002, pp. 114 - 118), keeping records has 5 main purposes, namely: fulfilling statutory requirements; enhancing formative assessment; facilitating communication with parents; communicating with other professionals and providing records as evidence. Additionally, Sainsbury (1994, p. 6) acknowledges that end of KS NC assessment relies on an aggregation of previous attainment, and thus, for this to be completed accurately, teachers need to keep records of pupil progress throughout the KS. This is also acknowledged in the concept of 'best fit' which as Stobart (2001) acknowledges is inherent within the Teacher Assessment aspect of NC Assessment. In order to determine a 'best fit' level teachers need to maintain records throughout the KS. The latest (2007) version of the Standards for Teachers identifies monitoring progress and record keeping as an important element in the core business of teaching where teachers are required to:

> Make effective use of an appropriate range of observation, assessment, monitoring and recording strategies as a basis for setting challenging learning objectives and monitoring learners' progress and levels of attainment.
> (TDA, 2007)

However, Brooks (2002, p. 119) recognises that 'The benefits of record keeping are easily undermined by systems which absorb inordinate amounts of time'. Thus it will be important to establish how schools manage the tension between a requirement to maintain records and the time it takes to capture and record data on each pupil in a systematic yet manageable way.

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## The Training of ICT Teachers

A comprehensive review of the literature relating to the training of ICT Teachers is beyond the scope of this study. However, three recent articles relating to teacher development and training are worthy of note. Hammond (2004) researched four cohorts of new ICT teachers in their initial training and then into their first appointments as qualified teachers. He discovered that although the field of ICT changes rapidly outside the classroom, in schools ICT as a subject is slow to change and a preponderance of traditional skills based teaching exists. He highlights (2004, p. 39) a '… disappointment with models of ICT teaching in school, arising to some extent from the continued use of non-specialist ICT staff teaching the subject.' It will be interesting to determine if evidence of this can also be found in this research and whether maturity and experience of teachers (see discussion on page 43) leads to more innovative approaches to curriculum delivery and assessment and whether the use of non-specialist ICT staff in teaching ICT is still an issue. Woollard (2005) has undertaken an investigation into the use of pedagogic metaphor as a tool for teacher training in computing. He concludes that ICT pedagogy as a whole can be developed by innovative use of metaphor to deliver conceptual knowledge in difficult to teach topic areas and that teacher development in ICT could benefit from a wider use of metaphor as a pedagogic tool. The discussion on page 64 refers to the teaching of underlying concepts in ICT, and as part of this research, it will be useful to consider how concepts are being taught and how schools are developing their own pedagogical approaches to ICT. Valcke et al (2007) consider ICT Teacher Training from a Dutch perspective. They draw a clear link between the content of teacher training courses and policies in place in schools. They conclude that school policies are not well developed and the link between training and need in schools is poorly matched. Whilst the Valcke et al study relates to the situation in Dutch schools, it will be important to determine if the same lack of coherence between school (and official Government) policy and the training and development of teachers is evidenced in the research I am undertaking.

## *Conclusion*

The main question that this research is intended to address is how the practices of assessment of ICT capability at KS3 illuminate the role of ICT as a subject in the school curriculum? The literature illustrates the difficulty in producing a universally agreed definition of ICT capability. It will be important in the research to determine if this lack of clarity is replicated in the experience and practice of schools. The current emphasis in school education in England is introducing a range of formative assessment techniques, some of which can have use in summative assessment events. Yet, traditional testing and product driven assessment still remains a dominant influence. It will be necessary to determine what methods schools are using to assess ICT, particular to see if some of the less traditional formative tools are finding favour and providing valuable insight into the progress of pupils. The literature indicates that issues of validity and reliability are never far from the surface when thinking about assessment. In practice there are a number of measures that schools can take to try to improve the validity and reliability of the assessment they undertake. It will be useful and necessary to determine what schools actually do in this area. The 'backwash' effect of assessment (see page 40) is well documented in the literature, and much media attention is given to 'high stakes' assessment in schools. This would tend to reinforce the reliance on traditional summative assessment methods. It will be important to determine some of the uses that schools are putting assessment to. Is the 'backwash' effect in

evidence, and how significant are the effects of league tables and other assessment based measures of school value? Teacher experience may be a significant factor in producing consistent and accurate judgements of pupil's attainment. It will be important to determine whether any link between experience and assessment accuracy can be found in the schools that are involved in this research. If teacher experience is the key to more consistency and reliability in assessment, then it will be important to determine what is being done in schools and elsewhere to develop the assessment practices of teachers. An overarching question seeks to identify implications for the teaching of the subject or assessment practices raised by the responses to the issues raised above  This final question goes beyond the analysis of findings from the research and seeks to look forward to make suggestions for improvements in the future. The answers to this question can only be determined once the research and analysis of data have been completed.

The review of literature has provided an academic context within which the research questions can be considered. The findings of the research will be discussed in the light of the literature in an attempt to provide some answers to these questions based on the practice of schools involved in the study. In the next chapter a methodological framework will be established and the methods of capturing and analysing data to address the research questions will be identified and justified.

# Chapter 3 – Methodology

## *Introduction*

In this chapter I describe the empirical basis for this research. I start with a situational position of the research within an overall framework and then define my own position within that framework. I then go on to define the overall design of the study within which I describe the methods used to capture and analyse data and the decisions taken that led to the sample of schools who were involved in this research. Finally, I consider ethical issues and the measures taken to ensure that the research maintains a strong ethical basis.

## *The Overall Perspective of the Research*

According to Ritchie and Lewis (2003) ontology is concerned with beliefs about what there is to know about the world. Therefore for the researcher in educational contexts, three key questions emerge: whether or not social reality exists independently of human conceptions and interpretations; whether there is a common, shared, social reality or just multiple context-specific realities; and whether or not social behaviour is governed by 'laws' that can be seen as immutable or generalisable? Cohen, Manion and Morrison (2007) suggest that the educational researcher needs to consider assumptions which concern the very nature or essence of the social phenomena being investigated. '… is social reality external to individuals – imposing from without – or is it the product of individual consciousness? Is reality objective or created?' (Cohen, Manion and Morrison. 2007, p. 5). Hammersley (1992) adroitly identifies a position he calls 'subtle realism'. That is that social phenomena exist independently of people's representations of them, but they are only accessible through those representations. This is a position with which I identify. To me, there is no doubt that the social phenomena of schools exist (no matter what my – or anyone else's representations of them might be), but I can only access these phenomena through the way in which I perceive them. The implication then is that if the research is to be accessible, the researcher has a clear responsibility to be explicit about their own perception of the social phenomena they are studying. Somekh (2005, p. 139) would agree when she states that 'what is observed is ontologically determined, that is it depends to a very great extent on how the observer conceptualizes the world and his or her place within it.'

Epistemology, again according to Ritchie and Lewis (2003), is concerned with what can be known about the social world. It concentrates on questions such as: what do we understand about reality and how have we determined our knowledge? Burrell and Morgan (1979) ask the question if knowledge can be vicariously acquired, or must it always be experienced? For the educational researcher a major issue emerges from this position in that the nature of the relationship between researcher and researched is highly significant. By entering in to the social phenomena being studied, the researcher has an impact upon the phenomena itself. The researcher becomes part of the context they are researching and their actions and behaviour affect the situation being studied, perhaps in unexpected or unpredictable ways. Hence there is no independent or objective reality, but what Berger and Luckman (1967) refer to as a 'socially constructed' understanding of what is happening in the context being studied. Within this perspective Cresswell (2003) summarises Crotty's (1998) assumptions about socially constructed research:

Meanings are constructed by human beings as they engage with the world they are interpreting. Qualitative researchers tend to use open-ended questions so that participants can express their views.

Humans tend to engage with their world and make sense of it based on their historical perspective – we are all born into a world of meaning bestowed upon us by our culture. Thus, qualitative researchers seek to understand the context or setting of the participants through visiting this context and gathering information personally. They also make an interpretation of what they find, an interpretation shaped by researchers' own experiences and backgrounds.

> The basic generation of meaning is always social, arising in and out of interaction with a human community. The process of qualitative research is largely inductive, with the enquirer generating meaning from the field.
> (Creswell, 2003, p. 9)

## *Methodological Approaches*

Accepting this position and then working from it, one main methodological approach presents itself. If we conclude that the researcher in a school context cannot detach himself from that context without totally destroying the phenomena that are under investigation, an ethnographic approach becomes the most applicable methodological framework within which to operate. Ethnographic methods (Hammersley and Atkinson 1995) are where the researcher becomes part of the context that they are studying and accepts that their presence in the context will have an effect on the phenomena they are studying. Central to this method is the acceptance that reflexivity (that is the presence of the researcher within a context will have an effect on the context) is a certainty for any researcher and thus should be embraced and investigated as part of the study being undertaken. So, according to Hammersley and Atkinson (1995):

> … instead of treating reactivity merely as a source of bias, we can exploit it. How people respond to the presence of the researcher may be as informative as how they react to other situations.
> (Hammersley and Atkinson, 1995, pp. 15)

This research is based within the maintained Secondary Schools in four education authorities in the North West of England. The school community being studied in this research is a familiar one to me. I have been working with this community over a period of years as a PGCE ICT Subject Leader, and Tutor and these schools have been partner schools with the University I work for. I have visited these schools to observe Trainee Teachers, working closely with teachers and heads of department as part of my day-to-day role in the university to develop new ICT subject specialist teachers for the profession. Whilst I am not ethnographically integrated in any of the schools, for example in the way that a teacher employed by the school would be, nevertheless I am not totally detached, remote or independent of these school settings as a researcher. Hence, the research is framed within an ethnographic approach because of my familiarity and relationship with the schools and emphasis on getting to the heart of how assessment in ICT is undertaken by schools. My aim is not just to uncover behaviour or action; it is to try to understand what lies behind the behaviour or action. Again, according to Hammersley (1983):

> … ethnography is a form of research in which the social settings to be studied, however familiar to the researcher, must be treated as anthropologically strange; and the task is to document the culture – the perspectives and practices – of the people in these settings. The aim is to 'get inside' the way each group of people sees the world.
> (Hammersley, 1983, p. 152)

As Clough and Nutbrown (2007) suggest:

> All researchers need to develop the capacity to see their topic with new and different lenses, in order to look beyond and transform their own current knowledge. … What distinguishes research from everyday interest or curiosity, however, is the opening up of familiar things to alternative ways of seeing.
> (Clough and Nutbrown, 2007, p. 49)

I am aided in maintaining the ability to uncover assessment practice in these schools, because, although I know and have worked with the schools over a period of time, I do not have detailed knowledge or understanding of their KS3 assessment practices. My involvement with the schools has been confined to the training of beginning ICT teachers and not associated with the day-to-day assessment of the subject as it is undertaken in the school setting. Hence, I believe that I can approach consideration of school assessment practice from an 'anthropologically strange' (Hammersley, 1983, p. 153) position.

## Research Design

According to Johnson (1995) the aim of qualitative research is to:

> … engage in research that probes for deeper understanding rather than examining surface features.
> (Johnson, 1995, p. 4)

Hence it is important for the researcher to ensure that the methods chosen to collect data for the research uncover the issues as viewed by the participants. This is particularly vital in the context of this research where I am seeking a socially constructed interpretation of actions and behaviours. In Giddens' (1979) expression, this research involves a 'double hermeneutic'. As a researcher, I am interpreting what is reported to me by the HODs, which is in itself an interpretation by the HODs about what is happening in the school in respect of their assessment processes;, thus the research is an interpretation of an interpretation. This is of course a limitation on the research as I am unable to engage in any participant observation of behaviours in school and I am reliant on the HODs impression and understanding of what happens in their context. Indeed, the interviews I conduct with the HODs are, as Cicourel (1964, p. 50) indicates, highly contextualised in time and place and hence very specific.

The ethnographic approach has strong links to anthropology. According to Goldbart and Hustler (2005):

> For some researchers it can only be 'proper' ethnography if the researcher is a participant observer in the everyday lives of whichever society or group she is studying.
> (Goldbart and Hustler (2005) In Somekh and Lewin, 2005), p. 16)

However, for practical reasons (see page 50), participant observation is not possible in the time constraints of this research. Hence alternative methods of data collection will be utilised.

The research questions (see page 17) are, by their nature firmly grounded in school practice. Hence any attempt to uncover answers to these questions will also need to be firmly rooted within the school context.

For this study, participant observation in the whole assessment process of KS3 ICT in a range of schools is practically impossible. As schools tend to conduct their KS3 assessments over the whole period of the KS, participant observation would require the researcher to be in every school, all the time for a period of at least 3 years. Even if a smaller participant observation schedule was devised, it would still be impossible for a single

researcher working alone to capture specific assessment data in a timely and efficient way. As this research is framed within an ethnographic approach where I am concerned with determining the varieties of assessment practice in schools, I am looking to capture what Goldbart and Hustler (2005, p. 17) call 'detailed descriptions and analyses of what people say and do'. Hence a series of semi-structured interviews exposes me as the researcher to a rich source of detailed information held by the Head of Department (HOD) in the school and will enable me to gather a range of relevant and contextually rich data to inform this study. So, whilst the lack of opportunity ro carry out observation of assessment in practice within the participating schools is a limitation on this research, access to the HODs of the ICT departments of the schools is the most practical and opportune way of discovering how these schools are carrying out assessment of ICT at the end of KS3.

According to Oppenheim (1992), interviews are useful for:

> … allowing the respondents to say what they think and to do so with greater richness and spontaneity.
> (Oppenheim, 1992, p. 81)

Direct communication through a one-to-one interview allows the researcher to find out 'why' things are as they are. As such, a series of interviews with relevant people in school settings is the most appropriate and obvious way of exploring what is happening with the assessment of ICT in schools and why things seem to be as they are. The fact that the interviews are conducted in the school setting is also in sympathy with the ethnographic approach being taken. As Silverman (2004) indicates:

> Meaningful reality is constituted at the nexus of the hows and the whats of experience, by way of interpretive practice. Interviewing is a form of interpretive practice, as respondents and interviewers articulate their orientations and understandings in terms of the experience in question.
> (Silverman, 2004, p. 149)

Adapting the work of Woods (1986), Cohen, Manion and Morrison (2007) identify three ethnographic attributes at work in an interview:

> Trust        There would have to be a trust relationship between the interviewer and the interviewee …
> Curiosity    There would have to be a desire to know, to learn people's views and perceptions of the facts, …
> Naturalness  As with observation one endeavours to be unobtrusive in order to witness events as they are, untainted by one's presence and actions …
> (Cohen, Manion and Morrison, 2007, p. 268)

The sample of schools that were involved in this research are all schools that I know and have worked with over a period of years. In many cases the HODs were personally known to me, and in some cases were ex-students of mine. I believe the relationship I have built with the schools over time was one of trust, and, as such I believe that the interview process can be conducted in an atmosphere of mutual trust and understanding. I am certainly curious to discover how schools assess pupils in ICT at KS3. I want to find out the similarities and differences of the approaches of the schools. I am curious to uncover the perceptions and opinions of the HODs involved, for I believe that these will provide powerful and rich descriptions of what is happening when schools assess ICT. I will endeavour to conduct the interviews in a natural way without intruding into the specific practice of the classroom by becoming a participant observer. As identified above (page 49), I accept some element of reflexivity as a consequence of my role as both interviewer and researcher.

Reflexivity requires an awareness of the researcher's contribution to the construction of meanings throughout the research process, and an acknowledgment of the impossibility of remaining 'outside of' one's subject matter while conducting research. Reflexivity then, urges us to explore the ways in which a researcher's involvement with a particular study influences, acts upon and informs such research. (Nightingale and Cromby, 1999, p. 228).

However, as also suggested above, my relationship with the schools gives me unique access to the HODs within this region, and so, whilst I acknowledge reflexivity, I also contend that without a relationship with the HODs which has developed over time and involves mutual regard, I would not be able to carry out this research in the same way. To ensure that my existing knowledge of each of the schools and the HODs did not distort my judgements and unduly influence the specific detail of the interview, I established a schedule of questions to explore with each HOD. Whilst this cannot prevent reflexivity, it can help to ensure that each interview has some consistency of approach. Although there was a schedule of questions for the interview (see Appendix 3), I allowed the interview to flow as naturally as possible and was as flexible as I could be in covering the range of questions identified. At all stages was aware of how my own beliefs and perceptions had the capacity to shape and influence the responses from the HODs.

Given that I knew the schools well, potentially all the HODs in the schools in the four authorities in the region could be interviewed. However, it would not have been possible within the scope of this research to carry out interviews in all schools, so some form of selection of participants for interview was needed. In order to restrict the field of possible schools for interview and yet also capitalise on an opportunity to survey every school in the region, I decided to send out a questionnaire survey to all schools.

As Opie (2004) suggests:

… the questionnaire is the most widely used procedure for obtaining information. It is relatively economical, respondents in distant locations can be reached, the questions are standardised, anonymity can be assured, and questions can be written for specific purposes.
Opie (2004, p. 95)

According to Bell (1999, p. 14) questionnaires are excellent at providing answers to what, where, when and how type questions. A large sample of the population of interest can be surveyed and general trends can be identified form the responses. Crucially, for this research, questionnaires can also be used to elicit a willingness to engage in further participation in the research. Hence the final question in the questionnaire use in this research asked if the respondent would be willing to take part in a follow up interview.

To carry out this research a research design was established that would allow for an initial questionnaire survey to be used to capture contextual data across a wide range of schools, with the intention that this would be followed up by semi-structured interviews with a selection of heads of ICT department in schools to uncover what Geertz (1973) calls 'thick' data contained within a small number of school contexts. Notwithstanding the limitations of the ethnographic approach taken in this study (identified on page 50), the generalisation of this research is secured by the steps taken to secure a representative sample of schools to interview (see page 54).

*Questionnaire Design*

A copy of the questionnaire can be found at Appendix 1.

Babbie, (2007, pp. 255-267) provides some excellent guidelines for asking questions in questionnaires:
He advocates:

- Clarity and the avoidance of convoluted language or jargon;
- Not to ask two or more questions at the same time;
- Not to ask questions where the respondents do not have adequate information to answer;
- Ensuring that questions are relevant and aligned with the purpose of the questionnaire;
- To keep questions short and avoid very lengthy questions;
- To avoid negative items because very often respondents will skip over the negative and understand the wording as affirmative;
- To avoid discriminatory language in any form.

The initial draft of the questionnaire was piloted with a small group of school-based ICT mentors at a mentor training event. The mentors were also provided with the paraphrase of Babbie's (2007) guidelines (above). The group considered the draft questionnaire in the light of these guidelines. The mentors identified some anomalies and issues relating to the wording of questions and in some cases a lack of clarity over what the question was asking for. This focus group recommended changes to the wording which was adopted for the final version.

After this modification and a further proof-check by colleagues in my department in the University it was circulated to all ICT HODs in Secondary Schools within the University's partnership. The questionnaire was addressed directly to the Head of the ICT Department with an accompanying letter of explanation and a pre-paid addressed envelope for its return.

The questionnaire was designed to contain a variety of questions focusing on the assessment practices of schools. The first 8 questions focused on factual responses relating to the way in which assessment is carried out and how consistency of assessment and moderation of assessment happens in the school. Questions 9 to 14 used a Likert type scale to attempt to elicit some attitudinal data from the HODs. The main aims of the questionnaire were to provide some contextual information upon which to base the subsequent interviews; to generate a greater range of data in the form of trends relating to school assessment practices and to identify schools willing to participate in the interview phase of the research.

The responses to the questionnaire were analysed using a simple tally system where each response was added to produce a total of responses for a particular option for each question. The tallied responses to the questions can be found at Appendix 2. Where respondents provided additional detail in the form of written responses or further detail, these were captured and used to inform an understanding of the respondent's answer to a particular question.

Analysis of the responses to the questions in the questionnaire will be undertaken in the next chapter.

### Design of Interview Schedule

A copy of the interview schedule can be found at Appendix 3.

According to Hannan (2007) research interviews are good at:
- giving informants the chance to challenge the agenda set by the researcher, raising new issues, asking questions back;
- collecting qualitative data, allowing the researcher to probe the meanings interviewees give to their behaviour, ascertaining their motives and intentions;
- giving informants the opportunity to check what is meant by a question;
- allowing for long and complex responses;
- flexibility - making possible changes in the order of questioning, the questions asked and the topics discussed;
- probing - follow-up questioning seeking clarification or further explanation;
- in-depth inquiry.

The advantages of interviews identified by Hannan (2007) are in sympathy with my concern to explore school practice in a way which seeks understanding and interpretation of the assessment practices in schools. The interview allows time for the HOD to offer detailed description and explanation of how their particular school carries out ICT assessment; it also allows for a greater exploration of the whole domain of ICT teaching and assessment than would be possible by means of a questionnaire alone.

A semi-structured interview approach was chosen with a common schedule of questions to be covered in each interview. The schedule identified a range of questions with initial and then subsequent follow-up questions to be asked. The schedule of questions was formulated after the responses to the questionnaire were received which allowed for some of the main themes identified in the questionnaire responses to be reflected in the interview questions. The interview questions were piloted with a colleague in the university who had recently joined the staff from a Secondary school outside of our partnership area. Her comments and suggestions were incorporated into the final schedule used in the interviews with HODs in school.

Although the interview schedule followed a semi-structured format, in practice there was considerable flexibility in the order in which questions were asked and some variety in the length of time allocated to discussion of questions dependent on the interaction within each interview.

### Selection of Participants

The study focused on schools in the North West region of the country and specifically in Blackburn and Darwen and Blackpool Unitary Authorities and Cumbria and Lancashire Local Authorities. As this study was limited to these regions, it can only be a case study and cannot be considered as fully representative of the country as a whole. However, as an indication of trends and an illustration of assessment practices, there is value in a regional case study such as this. Identifying the main issues relating to the assessment of ICT in a small number of schools within one region is likely to be representative of the issues faced by all schools when they assess ICT, particularly

as the aim is to get to the heart of school practice. Given that we have a statutory National Curriculum in England, it should be possible to use the findings from this research as an illustration of the general assessment practices undertaken in schools.

The University of Cumbria, the institution I work for, has its main partnership links with these four authorities. As such, the schools in these authorities know my institution well and because of long-standing relationships between the schools and my institution, I could reasonably expect that the schools in these geographic areas would allow me access to their HOD. In the first place a questionnaire was circulated to the head of ICT in all secondary schools in the North West geographic region with which The University of Cumbria has a partnership arrangement. The questionnaire was sent to 132 schools out of a possible total of 146 schools across the four authorities. The schools that were not included in this initial survey were schools that do not have a partnership relationship with the University. So, even though only University of Cumbria partnership schools were included in the questionnaire, this constitutes just under 92% of all secondary schools in the region. From the questionnaire 55 responses were received and this represents a return rate of 41%.

The return rate at 41% was considered satisfactory for a study of this type. Once the questionnaire returns were received, a selection process of schools for follow up interview was undertaken. A total of 30 schools indicated their willingness to participate in the interview process. From that initial response, a total of 10 schools were selected for follow up interview. Unfortunately, one school from this list was unable to participate, and despite efforts to replace this school with another, the HODs in 9 schools were interviewed. The process of selection of the schools that were interviewed is described below.

### Selection of Schools Used in the Interview Stage of the Study.

When it came to choosing schools for the follow up interviews, it was felt that characteristics could be identified that would influence the selection of schools for follow up interview. The table below indicates some of the comparisons of national trends with the region and the schools interviewed. The factors identified – along with other criteria used to select schools are discussed below.

### Characteristics of the region as representative of the whole partnership

As can be seen in table 3, the partnership covers two large Local Authorities (LA) – Lancashire and Cumbria – and two smaller Unitary Authorities (UA) – Blackburn and Darwen and Blackpool. Schools were chosen to ensure that both LA and UA representation was included in the interview process (although for purposes of ensuring anonymity of schools, this is not evident from the data in table 3). In addition, the selection was influenced by the geographical dispersion of the schools to ensure that all geographic areas of the partnership were sampled. This included a mixture of urban and rural schools. Care was also taken to ensure that centres of population such as the towns on the West Coast of Cumbria were included and not just the major towns and cities along the Motorway network. The cohort sizes in table 3 are illustrative of the urban and rural mix, with the smaller rural schools having very small KS3 cohorts.

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The region has its share of deprived areas as well as some affluent areas. The figures for the percentage of pupils receiving Free School Meals (FSM) in table 3 illustrate that this factor was included in the school selection process. In fact, all but 3 schools involved in the interview process had higher than the national median levels of FSM provision.

| National KS3 School Data: | Blackburn & Darwen UA | Blackpool UA | Cumbria LA | Lancashire LA | School A 11-16 | School B 11-18 | School C 11-16 | School D 11-18 | School E 11-16 | School F 11-16 | School G 11-18 | School H 11-16 | School I 11-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Experience as HOD (yrs) | | | | | 3 | 3 | 2 | 8 | 2 | 5 | 3 | 9 | 12 |
| | | | | | | | | | | | | | |
| KS3 Cohort size: | | | | | 292 | 45 | 49 | 293 | 167 | 165 | 177 | 167 | 132 |
| Mean – 190 | 201 | 214 | 153 | 162 | | | | | | | | | |
| Median – 185 | 205 | 215 | 159 | 161 | | | | | | | | | |
| | | | | | | | | | | | | | |
| % SEN (inc statemented) | | | | | 13.4 | 13.3 | 12.2 | 9.6 | 10.8 | 27.9 | 13.6 | 12 | 18.2 |
| Mean – 19.4 | 23.9 | 21.9 | 16.1 | 15.2 | | | | | | | | | |
| Median – 17.4 | 28.6 | 17.9 | 14.8 | 14 | | | | | | | | | |
| | | | | | | | | | | | | | |
| % FSM | | | | | 11.3 | 4.4 | 16.3 | 12.6 | 21.6 | 1.2 | 4 | 20.4 | 16.7 |
| Mean – 15.2 | 26.1 | 20.9 | 12.2 | 13.1 | | | | | | | | | |
| Median – 10.9 | 26.4 | 20.1 | 9.8 | 9.7 | | | | | | | | | |
| | | | | | | | | | | | | | |
| % EAL | | | | | 1 | 0 | 0 | 0.3 | 0 | 3.6 | 5.1 | 4.2 | 1.5 |
| Mean – 9.3 | 22.4 | 1.3 | 0.6 | 6.2 | | | | | | | | | |
| Median – 2.1 | 8.2 | 1.2 | 0 | 1.2 | | | | | | | | | |
| | | | | | | | | | | | | | |
| % Attendance | | | | | 91.8 | 95.3 | 92.9 | 90.4 | 93.1 | 89.9 | 94.3 | 90 | 91.1 |
| Mean – 92.5 | 91.9 | 89.4 | 93.1 | 92.3 | | | | | | | | | |
| Median – 92.7 | 92.1 | 89.1 | 93.3 | 92.6 | | | | | | | | | |
| | | | | | | | | | | | | | |
| % L5 KS3 | | | | | | | | | | | | | |
| English – 71 | 71 | 67 | 85 | 68 | 78 | 87 | 67 | 60 | 62 | 67 | 85 | 69 | 72 |
| Maths – 67 | 72 | 58 | 84 | 59 | 82 | 87 | 76 | 72 | 71 | 72 | 91 | 77 | 80 |
| Science – 63 | 58 | 64 | 86 | 53 | 83 | 93 | 71 | 66 | 66 | 70 | 86 | 72 | 77 |

Table 3 – 2006 Data Comparison – Regional and School with National Figures

### *Characteristics of the Schools*

Linked to the urban/rural balance was consideration of the size of school. In general, the rural schools tended to be smaller and their pupils travel to school from a wider geographical area than the urban schools. The urban schools were larger and had a less dispersed catchment area (although this is not entirely true for the larger Cumbria schools where pupils do travel to school from a wider area than many urban settings). However, in the sample of this study, two schools are particularly small (with KS3 cohort sizes of 45 and 49) and these schools are small rural schools in Cumbria. The schools involved in interview varied in total size from 325 pupils (rural Cumbrian school) to over 1200 (urban Blackpool school).

Alongside this, some consideration was given to the overall levels of attainment of the schools. This is a problematic area, in that published data such as league tables is open to criticism that it does not necessarily represent the true value of a school. The figures identified in table 3 indicate the percentage of pupils who achieve L5 or above in the KS3 tests in the core curriculum subjects. Regionally, Cumbria can be seen to be particularly high scoring in comparison with the national data. However, this is caused by a relatively small number of selective schools that skew the overall picture. In the sample chosen, the schools are mostly above average (in comparison with national figures) in Maths and Science, but were mostly below the average figure for attainment in English. Another measure used here was the percentage of pupils recognised as having a Special Educational Need (SEN). The two LA in the region are below the average for this in comparison with the national figures; whilst the 2 UA are above the average. In terms of the schools selected, the figures illustrate that the schools were generally below the national average (with one exception), although they were broadly in line with the average for the LA in the region.

School attendance in the region under study is generally good and the schools selected represent a spread of attendance data around the national average.

The North West region has a number of population centres where there are sizeable ethnic minority communities. However, these tend to be in the South and East of the region and, looking at the region as a whole, the majority of schools in our partnership have small numbers of ethnic minority pupils. Across the region, there are a number of faith based schools and consideration of the faith element of the school was included in the selection process. However, the very small number of non-Christian faith based schools in the region do not operate in partnership with us and so were not included in the original questionnaire. This meant that only Christian founded schools were included in the interview sample. Whilst this means that views of non-Christian faith based schools were not represented in the interview process, care was taken to ensure that the schools that include a significant mix of ethnicity were sampled. However, judging by the percentage of pupils who have English as an Additional Language (EAL), the region as a whole can be seen to be lower than the national expectation and the schools interviewed were particularly low on this measure. Unfortunately, one school that had been chosen for interview where the percentage of EAL was more representative had to pull out of the interview process and so detailed data from that source was not captured.

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The region is generally split between Lancashire (or former Lancashire) LA schools (which include the two UA) that have an 11 – 16 provision and Cumbria which has an 11 – 18 provision. Whilst this is not absolute and there are some exceptions in schools in all authorities in the region, care was taken to ensure that both 11 – 16 and 11 – 18 schools were included in the interview process.

Of the schools interviewed, there was a wide difference in the size of the ICT departments. Some had a HOD and one other full time ICT teacher; others had a departmental staff of 5 or 6 ICT specialists. A number of schools relied on non-specialist staff (often part-time from other departments) to teach in the department.

### *Characteristics of HOD*

It was noticeable when selecting schools that a number of schools had appointed a new HOD in ICT within the last 3 years. It was felt important to ensure that some of these HODs were included in the interview process. These individuals have 'grown up' as HODs with the Key Stage 3 Strategy materials, so their perspective was considered useful to capture. By the same token, it was also important to ensure that the sample included a number of HODs who had been in post for more than 3 years. Because these individuals will bring experience of departmental leadership from before the KS3 Strategy was introduced, their view is also considered important.

One factor that was identified from the original trawl for interview respondents was that there were a greater number of female HODs willing to be interviewed than there were male HODs. As a consequence a number of male HODs were contacted personally to encourage them to be interviewed. Thus an attempt was made to provide a gender balanced perspective from the HODs. However, this does mean that these schools were not 'self selecting' in the same way that the others were, and there is scope in the method by which they were selected for researcher bias to creep in. However, given the discussion above about the criteria by which schools were included in the interview sample, there is plenty of scope for researcher bias to have been a factor in applying these criteria as well, so the specific targeting of male HODs in this way was considered to be an acceptable strategy. Within this targeting of male HODs, the other criteria established above were also considered to ensure that a balance of characteristics was achieved wherever possible.

Most HODs were not ICT specialists by virtue of their initial training as teachers, or as a result of specialist ICT qualifications. A number were ex-mathematics teachers. This characteristic was closely linked to time in post. Of the HODs interviewed, three were specialist ICT teachers by virtue of qualification and training.

Once the interviews were transcribed, the analysis of the transcripts was undertaken using a qualitative analysis computer program called Textual Analysis Mark-up System (TAMS). This program is similar to other qualitative analysis software in that it allows the researcher to code the text of the interview and then allocate codes to categories from which similarities and trends can be identified.

TAMS is an open-source program originally produced at Washington University in the USA. I chose this program because it was freely available. The interface and control of the software is easy to navigate and coding is undertaken in an intuitive and logical way.

The flexibility of TAMS allows for the three different types of coding identified by Richards (2005, pp. 90 – 95); namely, descriptive, topic and analytical coding. As part of the coding process, I looked for 'in vivo' categories, where the words or terms used by the interviewees were so remarkable that they could be taken as codes. This was particularly useful in that common terminology was often used by the interviewees. Because education (and particularly ICT education) is a terminology rich domain, this proved to be a useful technique for identifying commonality between interviews. An extract from the code book established in the analysis of this data can be found at Appendix 4.

Stemler (2001) refers to the identification of the 'key word in context' as an important means to ensure that the analysis of the transcribed text from interviews is consistent in terms of eliciting meaning from the text. The technique is to identify a particular word or phrase of significance or importance, and then use software tools to extract the text containing that word or phrase within the context of the sentence in which it occurs. This is a more analytical and valid technique than relying on a simple word count to determine the significance of words or phrases. TAMS provides the software tools to do this and this technique was used to collect together portions of the interviews (in context) where consistency of meaning could be inferred.

I used a process of emergent coding so that I determined from the transcribed text of the interviews which words and phrases I considered to be significant. There is an inherent weakness in this approach in that I was the only person involved in determining the codes used in the analysis. In larger research projects, it is considered valid for more than one person to carry out emergent coding so that a consensus of opinion over the codes to be used can be arrived at. The individual nature of this study meant that this was not possible in this case and this must be seen as a limitation on the analysis of the data from the interviews.

Once common codes, categories and themes had been identified within the text of the interviews, I extracted the relevant portions of the text for use in the analysis of the data in the next chapter.

## *Ethics*

Kemmis and McTaggart (1992) established a useful set of ethical principles to guide researchers in the social field. More recently McPherson and Tyson (2008, in Elton-Chalcraft, Hansen and Twiselton (2008)) have identified five 'C's' for the researcher to consider when ensuring that research is undertaken within an ethical framework and under ethical principles.

> Conduct – before, during and after the research has been undertaken
> Confidentiality of responses and in terms of identifying participants within the research
> Consent and permissions to undertake the research (possibly form a governing body or from your institution's ethical research committee)
> Choosing a methodology that is fit for the purpose

In terms of this research and following McPherson and Tyson's 5 C's, I maintained a clear understanding of the ethical responsibilities of the research throughout the research process. At each stage, I ensured that confidentiality was maintained. Although each questionnaire was numbered for identification purposes, I was the only person who had access to the system of identifying the school from the number on the questionnaire. That information was destroyed once the questionnaires had been analysed. In terms of the interview data, again, I was the only one who had access to the information to link each interview with a particular school. I personally transcribed the recordings of the interviews and ensured that any possible identification of a school or town was not included in that transcription. Once the interviews were transcribed, the original recordings were destroyed. Within each interview, I was careful to ensure that I did not refer to any previous interviews I had carried out in this study, or to identify any other schools who were participating in the research.

At every stage participants in the research were asked for their consent to the research. Non-participation was always an option, as was withdrawal of consent at any stage. In one instance, a HOD was uneasy about having the interview recorded, and so that particular interview was not recorded and I relied on taking detailed notes in that instance. As both the questionnaire and the interview involved HODs, I did not personally seek permission from Head Teachers for this research, but I know that more than one HOD did ask their Head's permission to participate in the interview.

I believe that the methodologies I have used in this research are not only fit for purpose, but the most appropriate in ensuring anonymity of response. Of course, by its very nature, qualitative research of this kind is interpretive and thus there is a likelihood of bias on the part of the researcher. I have attempted to minimise this effect by selection of a range of different school contexts to involve in the research. However, I acknowledge that interpretations that have been placed on the data gathered in this research are mine alone.

Undoubtedly, any consideration of assessment within schools brings with it an element of potential anxiety on behalf of the school and the HODs involved. I have been very aware of the sensitivity of the information I have been privileged to gain access to. Without avoiding consideration of important (and perhaps sometimes controversial) evidence, I believe I have treated each participant fairly and ethically.

## *Summary*

Operating within a qualitative framework, this study has used two main instruments for gathering data. A wide sample of participant schools was surveyed using a questionnaire and then this was followed up by a selected sample of interviews with HODs. Efforts were made to ensure that the sample of interviews undertaken was representative of the region as a whole across a range of dimensions. Analysis of the transcribed interview data was supported by use of a computer software package specifically designed to

assist in the analysis of qualitative textual data. Consideration of ethical issues has been in evidence throughout the research.

# Chapter 4 - Analysis of Data

## *What is Happening When Schools Assess ICT?*

### Overview

The analysis in this section identifies that Heads of Department (HODs) in School are able to identify characteristics that they use to distinguish capable from non-capable pupils. However, each HOD uses slightly different terminology and is referring to inherently different characteristics. Whilst there is some common ground between their statements, no comprehensive and universal set of criteria for measuring capability emerged from the interviews. There are also some obvious gaps in the range of definitions used by the HODs.

The definitions themselves create some difficulties. Identifying exactly what is meant be a phrase and then also whether or not it is really applicable in a consistent and universally understood way is by no means clear.

Ultimately, focusing on definitions in this way highlights a major problem of capability and competence models of assessment. As identified by Wolf (2000), capability is in reality a very complex mix of actions, cognitions and behaviours, yet many assessment models produce an atomistic and highly reduced set of observable characteristics against which the pupil is assessed. The result is that the assessment fails to capture the subtlety of the situation (Sainsbury, 1994, p. 6) and thence derives an inappropriate conclusion from the assessment data that is captured. The reduction of pupil capability to definitions such as the ones identified in this section is an example of this atomistic reduction. So even if we were able to agree definitions and have a clear understanding of what each one means, we would not necessarily be any closer to a comprehensive set of criteria against which we could reliably assess pupils in order to capture the subtlety that Wolf refers to.

### *How Schools Define Capability in Practice.*

The Government expectation at the end of KS3 is that the average pupil will achieve L5 on the NC level descriptors. Over the past 5 years, and particularly since the introduction of the KS3 ICT Strategy, there has been an increasing emphasis on pupils achieving at least L5 at the end of the KS. Implicitly in schools, particularly in the light of the high stakes associated with the publication of the end of KS assessment data, L5 has become the benchmark so that a pupil who reaches L5 can be identified as 'ICT capable', whilst a pupil who has not achieved L5 would not. This clearly confirms the tension identified by Brown (2004) over the use of assessment processes to provide a mechanism of accountability for pupils and schools.

In the interviews HODs it was possible to explore the notion of capability within the discussion and begin to determine how schools were defining capability in respect of their pupils. As suggested by Crawford (2001) and Lankshear, Peters and Knobel (2000) (see page 24), this exploration with the HODs confirmed that

capability was a difficult thing to define. In fact, the word 'capability' was infrequently used by HODs in the interview dialogue. Instead, many of these discussions centred on the boundary between L4 and L5 attainment of pupils as a measure of identifying 'capable' or 'non-capable' pupils. The discussion below identifies and analyses the phrases used by the HODs to distinguish capable pupils from non-capable pupils in terms of their attainment against the NC Levels.

### The Acquisition of Skills

One HOD noted that:

> "… because we've been teaching for so long, we're in to teaching skills and perhaps we're not as equipped as we should be to teach what they're asking for which is a much rounder thing and is a more enquiring basis isn't it?"

This implies that the teaching of skills in ICT is in some way no longer appropriate. However, it is difficult to see how someone could become capable in their use of ICT without having acquired a range of skills in the use of ICT tools (Quellmalz and Kozma's 'procedural knowledge' page 29). There is certainly a debate (commencing page 25) about the importance of skills and the recognition that capability is more than the acquisition of skills and nothing else, but here the HOD seems to be indicating that the teaching of skills is no longer appropriate in the ICT curriculum. There is a tension here in that, as identified below (commencing page 72), the teaching of discrete behaviour is a regular element of the pedagogy of ICT. It is relatively easy to assess a pupil's ability to perform a sequence of actions that result in some observable response in a computer application. Yet remembering sequences of key press alone would not constitute 'capability' without some understanding of underlying concepts. Unfortunately, the teaching and assessment of these underlying concepts is both difficult and, according to the evidence of this research, rare.

This HOD also recognises the place of skills acquisition in the development of capability:

> "... you're not going to get it until you've learnt the skills, the basic skills."

So for this HOD, concentration on acquiring skills is seen as a pre-requisite for the higher order aspects of capability which finds resonance with Crawford (2001) and Kennewell et al (2000) and the idea that capability is made up from a hierarchy of elements.

### Independence of action.

In Interview 1 the HOD identified an ICT capable pupil as one who is:

> " … working more independently and they're able to reflect and assess their own work better."

This definition reflects some laudable characteristics. It finds some resonance with the definitions of capability of both Cairns (2000) and Crawford (2001) (pages 24 and 24). Implicit within this definition is a recognition that capable users of ICT make choices about the most appropriate tools or applications needed to solve the problem they are faced with; they can make independent choices. Additionally, the ability to

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assess the effectiveness of a particular solution and reflect on their work indicates the possibility that the pupil is thinking about how effectively they have approached the initial problem and how appropriate their solution may be. It also suggests the potential to generate a more effective solution in the future. As noted above (page 25) this confirms Kennewell et al (2000) argument that capability implies the capacity to respond appropriately in unknown or unfamiliar circumstances.

However, this is not a particularly comprehensive definition of capability. In fact the words used here bear a close resemblance to the NC level descriptor for students working at L5 on the NC Level Descriptors for ICT at KS3. Although a close alignment between the school's interpretation of the characteristics they are looking for in a 'capable' pupil and the statements produced in the NC is probably a good thing, using a definition such as this as the yardstick for assessment of pupils has some problems. For example, how would we determine what 'more independently' means? Is there a scale of independence that we could universally agree on? Is it not possible for a pupil to work independently and yet demonstrate a complete lack of 'capability'; perhaps by choosing totally inappropriate methods to solve the problem they have been set? Also it would seem possible for a pupil to be able to reflect on and assess their own work even though they have not been 'independent' in terms of making informed and appropriate choices of ways to solve the problem.

In interview 8, the HOD indicated the difficulty some pupils face when trying to decide the most appropriate ICT to use in a situation:

> "… the skill that haven't transferred so well I think is where they, where they're asked to choose the best IT, ICT tool for the job. They're not so good at that, still. You know they find it difficult to say like ... I want to, I want to say er produce an invoice, or I want to do a maths investigation, what is the best piece of software to use? You know, we still get people who think, well I need to write a database or I need to ... put a table in word or something. You know it's they, they need to be led still."

So in this school, even where pupils are encouraged to act independently, the HOD has identified that some pupils lack the ability to make appropriate judgements about the ICT tools to apply to a given situation. Hence the teacher leads the pupils to a solution and this inevitably limits the independence of action demonstrated by the pupils and consequently limits the assessed level they reach. Thus, if the pupils are not acting independently, then they are not demonstrating capability in terms of an 'independence of action' criterion.

Talking about the difference between L4 and L5, the HOD in Interview 6 echoed some of the other comments:

> "… they have to actually do something and change something themselves rather than just following instructions. There is a definite change around about there. …
> … I think that's where we're saying that they have to do that bit extra, you know. It's quite, it's quite a key jump isn't it the 4 to the 5 one? Because it's to do with their ability to think."

This resonates with other comments about pupils reflecting on their work and working independently.

### Learning by Trying

Interestingly, none of the HODs interviewed mentioned to the idea of 'learning by trying' referred to in the work of Pearson (2005), Phelps, Hase and Ellis (2005) and Selwyn and Gorard (2004). The emphasis in schools was very much that purposeful activity is that which results in some form of product that can be assessed. This resonates with Rowntree's (1997) illustration that tangible products are easier to assess and thus assume more importance in the pedagogical approach to the subject.

### Transferability

In Interview 2 the HOD talked about capability as being about:

> "… transferability …"

Again, we can see merit in this idea. As indicated by Kennewell et al (2000) (page 25), for a pupil to be able to transfer what they have learnt in one application or context into another different application or context would suggest that they have some level of capability, provided that the transfer of knowledge is appropriate. In reality of course in this day and age some level of transferability is absolutely necessary. Computer applications are designed in the modern era to conform to common interface standards precisely so that users can transfer skills from one application to another. So, perhaps the most worthwhile test of transferability would be to face the pupil with an unknown piece of software to see how well they could find their way around the application using the knowledge and understanding that they possess from their past experience. The pilot end of KS3 ICT test (now scrapped) was supported by software that did not conform to the Microsoft Windows$^©$ Applications Programming Interface and when introduced to schools it caused many problems because pupils were not used to the software. Hence their ability to transfer knowledge and understanding was, in this case, limited. As this comment from the HOD in Interview 8 illustrates:

> "Well you have to, you have to be more, you have to teach them first of all how to take the test. Because it's different software isn't it. The whole thing is, is, is erm, it has a different feel to the Windows software they use for most of their school life."

This comment would suggest that pupils, in this school at least, find difficulty in transferring skills and knowledge acquired elsewhere to new software applications. Does this then mean that these pupils are not capable users of ICT? Also, is the role of the school important here in ensuring that pupils have access to a wider range of software, particularly that which is different to the standard office applications that they may be very familiar with? This example also illustrates an unintended 'backwash' (Snow, 1990, p. 435) (page 40) of the assessment process in that the school was having to devote curriculum time to teaching pupils how to cope with the test rather than concentrating on the learning objectives of the SOW. The 'backwash' effect will be discussed further below.

Another aspect of transferability relates to the ability of pupils to transfer learning from their ICT lessons into other areas of the curriculum and demonstrate usage of ICT tools in a totally different context. Some schools

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do this well, but many have arranged their curriculum around discrete ICT teaching that rarely interfaces with other subject areas. In fact it could be argued that the KS3 ICT Strategy has exacerbated this tendency as it emphasises the importance of discrete ICT lessons in schools, even though the reasoning behind this is very laudable (namely, ensuring that all pupils receive their entitlement to the curriculum). Hence the potential benefits of transferring the skills, knowledge and understanding developed in ICT lessons to other areas of the curriculum does not seem to be realised. Thus if we were to insist on 'transferability' having a high priority in our definition of capability, the evidence from the schools involved in this research would suggest that many pupils lack this important characteristic.

Some HODs discussed transferability in Kennewell et al's (2000) sense where pupils are able to transfer learning in one ICT context to another ICT context, yet, due to the often fragmented nature of teaching ICT where topic areas are taught discretely (usually) once per year and then not returned to until next academic year, this discussion centred around the ability of pupils to retain knowledge from one year to the next. For example the HOD in interview 7 was concerned about how much knowledge and understanding is retained by pupils:

> "… they can achieve a level 5 in modelling in year 8, but you get to the following year and they still cannot remember and they have to be ... it has to be refreshed. You know, they don't keep it, they don't retain it, and that, and that has to be a fault somewhere."

This raises an interesting question about whether or not the assessment systems in school encourage or develop the ability of pupils to retain and transfer knowledge from one context to another. The evidence form this research is that assessment follows the pattern of teaching delivery and assesses fragmentary knowledge rather than holistic understanding that combines knowledge from a number of different ICT domains. This point is further explored on page 69.

### *Fitness for Purpose*

This statement from the HOD in interview 2 suggests capability is also:

> "… about fitness for purpose …"

This uses a key phrase taken from the KS3 ICT Strategy sample teaching units. It is also directly descended from the work of Mills (2003) (page 27). There is a strong emphasis, particularly in the ICT Strategy Y7 sample teaching units relating to the use of ICT tools to communicate, on ensuring that when ICT is used, the resulting product is fit for the intended audience and purpose. It is certainly hard to argue against any attempt to make the products of the use of ICT applications appropriate for the audience they are intended to reach. However, it would seem to me that this notion of fitness for purpose goes beyond ICT capability into wider areas of discussion around what it means to communicate effectively. Consequently this would be an important element of an indication of capability that goes far beyond ICT capability. The point here is whether or not ICT Capability is discrete and decontextualised? Is there something particular and unique about capability in an ICT sense that marks it out from capability in other subjects or contexts? The Mills (2003) model might imply this where he defines fitness for purpose as an ICT Concept. Of course, if fitness for purpose in communication is being coordinated effectively across a range of subjects in the curriculum in
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school so that consideration of effective communication is not just limited to ICT lessons, then the overall effect for pupils may be wholly positive and beneficial. As indicated above, some schools achieve this coordination effectively. However, where it is not achieved, it may result in pupils assuming that fitness for purpose is something that is confined to ICT lessons only, or that fitness for purpose in an ICT context is somehow different from communication being fit for purpose in, say, an English lesson. This point further illustrates Wolf's (2000) observation that capability is complex and multi-faceted and, by implication, always going to be difficult to assess within a specific discrete subject area.

### Pupils Justifying the Choices They Make

In Interview 3 the HOD defined capability as:

> "… I would say, justification, erm, being able to justify, erm, what they have used or created."

In this definition, the ability to justify choices or decisions would depend on pupils being able to articulate the reasons behind what they have done. Again, there is much emphasis in the KS3 ICT Strategy (and more recently in the Assessment for Learning Strategy) on pupils annotating their own work to justify what they have done and why they have done it. There could be some subtlety here. If a pupil is actually able to articulate reasons behind the choices they made having considered a range of choices in the first instance, this may illustrate some sophistication in their use of ICT tools to solve the problem. However, if their justification is based on the use of a particular tool or technique because they did not know any different, then it is less helpful.

This point was highlighted further in the discussion with this HOD when they went on to say:

> "… when we have our discussions that's their opportunity to articulate. Erm, sometimes with a little bit of prompting, without being leading, you know, just saying, you know, why did you use that colour? And, and drawing that out of them. Erm because for the majority of the time, pupils do know why they've used a particular colour but they just don't know how to say that, how to articulate it …"

Hence, as suggested by the work of Wells (1999), Mercer (1995) and Zoellner (1969), the role of the teacher here seems to be prompting and facilitating the pupil's articulation justifying their choice. The problem here is where a pupil has a good justification for the choices they have made, but lacks the ability to articulate their decision making. As the HOD indicates, there is a role here for the teacher to assist them in drawing this out, but this type of activity can quickly result in putting words into the pupil's mouth if the teacher is not skilled or not careful. At what point do we move away from the pupil's articulation of the choices they have made to the teacher's interpretation of what the pupil has done? This clearly relates to the discussion in the literature review (and also above) about the nature of 'communication' as an underlying skill and also whether this skill is unique to the domain of ICT or somehow different in ICT than in other subjects. It also echoes Sainsbury's (1994) (page 41) perspective on the 'impressionistic' nature of teacher assessment.

The HOD in Interview 4 stated that 'capable' pupils:

"… demonstrate that they've got a clear understanding of what they're doing, they're not just able to follow instructions and use software. That they have to be able to explain why or how whatever it is that they've done. I think that's the key thing. So, we expect annotation, but also when going around, er, following pupils that they, they have more independence of working and also that as you talk to them, it's clear that they actually do understand what they're doing."

This HOD clearly identifies a difference between understanding and following instructions or demonstrations. The implication is that the more capable pupil will remember the instructions or sequence of actions and then understand how it is to be applied to the particular problem they are faced with. This would equate to Schematic and Strategic Knowledge within Quellmalz and Kozma's typology. Of course, there is a difficulty in defining what we mean by understanding in this context. The pupil may well understand what they are doing, but may not understand why, particularly if this is related to underlying concepts.

The HOD in interview 7 was concerned about how much knowledge and understanding is retained by pupils:

"I still get very concerned about the back to basics idea. I still think that you do things and you think, but they don't know what they should know from before. You know, and another thing about levelling is which I've not really come to terms with is yes they can achieve a level 5 in modelling in year 8, but you get to the following year and they still cannot remember and they have to be ... it has to be refreshed. You know, they don't keep it, they don't retain it, and that, and that has to be a fault somewhere."

So for this HOD the capability demonstrated by a pupil may well be transitory and unable to be replicated at a later date. As a response, this HOD's school has chosen to base the final KS3 assessment level on Y9 work only, ignoring the work from earlier years in the KS. Whilst this may be a pragmatic solution for this HOD in this school, it nevertheless raises some important questions. For example, if the Y9 work is the only work being used for the end of KS3 levelling, there seems little point in following the KS3 curriculum in years 7 and 8. If the pupils are not retaining any of the Y7 and Y8 work, it would seem to be more stimulating for the pupils to devise a completely new Y7 and Y8 curriculum. On the other hand, as seems likely, if the level of retention of knowledge from Y7 and Y8 is variable among the KS3 cohorts in the school, this suggests that the teaching methods in those 2 year bands need careful scrutiny. The difficulty here is that because so much of ICT assessment is atomistic and focused on discrete behaviours, these behaviours are often easily forgotten. Even experienced and 'capable' users of ICT will struggle to remember exact sequences of key press for a rarely used function of an application. Yet these sequences are too often the fundamental building blocks of ICT teaching and assessment in many schools. As identified above (page 64) much less time is spent on underlying concepts that may help the 'capable' pupil to work out how to access a particular aspect of a program. Also as indicated in Chapter 2 (commencing page 31), any activity that could be seen as unfocused, even though it may be leading the pupil towards a solution, is actively discouraged.

### Problem Solving, Independent Learning and the Role of Teachers

In Interview 5, the HOD identified the difficulties faced by some schools:

"… it's much more problem solving and independent learning and our students are very, very poor at independent learning."

This is not only a statement indicating the HOD's impression of what capability in ICT might mean, but also a value judgement about the ability of the pupils in the school to be able to cope with it. Again it is possible to argue that problem solving and independence in learning are not unique characteristics of capable learners in ICT, and, also that it is not solely the responsibility of the ICT curriculum to develop these characteristics in pupils. Hence an increasingly broad definition of 'capability' that is encompassing ideas and characteristics from a wide domain. The implication of this is that, not only does this make capability difficult to define, it makes it increasingly difficult to assess consistently and reliably. Given this complexity, it is understandable why Popham (1984, p. 39) is concerned about the way the measurement of behaviour can become trivialised in an attempts to assess pupils.

The statement of the HOD about the pupils not being independent learners may be a statement of fact, but it is also perhaps illustrative of a lack of innovation and development on the part of teachers in the department. If the pupils really are poor independent learners, then the curriculum should be redesigned to develop independence in the pupils and teachers should be trained to use pedagogical techniques that will do this. On the other hand, it may be that the pupils are capable of independent learning, but they are not being given sufficient encouragement or opportunity to demonstrate this. Again, the development and training of teachers in the school may be lacking in this regard.

This is further illustrated in an additional comment from the HOD who stated:

> "… because we've been teaching for so long, we're in to teaching skills and perhaps we're not as equipped as we should be to teach what they're asking for which is a much rounder thing and is a more enquiring basis isn't it?"

So this HOD recognises that providing pupils with the opportunity to acquire and demonstrate capability also requires pedagogic skills and techniques on the part of the teachers that are different from the teaching that may have gone on in the past.

The comments extracted from interviews confirm the difficulty identified in the literature review related to defining what we mean by capability and thus the difficulty schools face when they are trying to assess it. These comments are from experienced and well-qualified staff in schools that are leading ICT departments. If they are unsure or confused about what they are looking for and how they are able to measure it, this illustrates some of the problems that are inherent in the process of trying to assess ICT capability.

## Conclusion

The lack of a clear and consistently applied definition of 'capability' is producing a wide variety of practice in relation to what is being assessed. An issue relating to a lack of knowledge of non-specialist ICT staff and their confidence to deliver the underlying knowledge and understanding of the ICT curriculum has been identified (see discussion on page 46). Traditional 'product based' assessment is still widely used and this 'traditional' approach exerts strong influence, not only on what is assessed, but also how the assessment is carried out. Tangible products are easier to assess and thus assume more importance in the pedagogical

approach to the subject. This was particularly highlighted in interviews by the discussion about the methods used to collect assessment data for the purpose of tracking pupil progress. This issue will be followed up in the next section relating to the types of data that are being collected and how schools are capturing them.

## *How Assessment is Carried Out*

### Overview

Schools are using a variety of means to carry out assessment. There is a heavy reliance on traditional means of assessment that rely on data being captured from the product of a pupil's use of ICT rather than the process the pupil goes through to create the product. Whilst this can be seen as a weakness in providing an 'holistic' view of a pupil's attainment, it represents the relative 'newness' of the use of less-traditional and formative assessment techniques in schools. Where these 'new' techniques are more firmly established, schools are increasingly comfortable using verbal and anecdotal evidence to inform their assessment judgements. An increasing use of pupil self-assessment is in evidence, but in the interviews conducted, systematic and rigorous use of pupil self-judgement is yet to be firmly embedded in assessment practice. This suggests that pupil self-assessment is not yet providing a reliable and useful assessment tool.

An important theme raised in this section relates to the confidence of teachers and HODs in the assessment judgements they are making. The importance of experience in assessing is acknowledged and also the relevance of high quality training in assessment techniques is underlined. Some HODs indicated how intuition and 'gut feeling' can be used to inform the assessment judgements that are made. However, in some schools the HODs were reliant on inexperienced and non-specialist staff to make assessment judgements, and, as a consequence, there is the potential for a lack of consistency and reliability in the assessments that are being made. Some schools are systematic in the use of moderation as a means of ensuring consistency of judgements, but this is by no means universal across the schools involved in this research. The issues raised by the reliance on experience and intuition in forming assessment judgements will be revisited elsewhere in the discussion.

### How Schools Capture Assessment Data

In Chapter 2 (commencing page 33)   Rowntree's 8 modes of assessment were summarised. Each mode could be seen as a continuum between a pair of statements. These are:

> Formal vs Informal
> Formative vs Summative
> Continuous vs Terminal
> Course-work vs Examination
> Process vs Product
> Internal vs External
> Convergent vs Divergent
> Idiographic vs Nomothetic
> Rowntree (1997, p. 119)

I intend to use these terms (as appropriate) in the discussion below to illustrate how the practice I have identified in schools is linked to the issues identified in the Literature Review.

## *Teacher Assessment*

Most schools in the interview discussions indicated that they were using a variety of forms of evidence to base assessment judgements upon. Whilst much of this assessment still tends to depend on pupils printing work or producing some kind of hard copy evidence, schools reported using observation of pupils, discussion and peer and self-assessment in their assessment regimes.

The schools interviewed were able to describe and sometimes demonstrate the recording mechanisms being used to track pupil progress throughout KS3; what was less clear was how the assessments and judgements were captured in the first place. Where teachers were marking 'output' produced by pupils, it is easy to see how individual marks can be recorded in a departmental tracking document of some kind. However, where assessment judgements are being based on more informal processes such as discussions with the pupil or observation of the pupils in the class, it is more difficult to determine how these judgements are being captured.

What emerged from the interviews was that the HODs had a clear understanding that teacher assessment includes all of the assessment work undertaken by the teacher. This issue was raised in the questionnaire in question 10 where there was a high (40%) of responses indicating that accurate assessment needed more than teacher assessment. This response is interesting in that it implies that, for 40% of the questionnaire respondents, teacher assessment alone is not sufficient for 'accurate' assessment. This is not surprising given the heavy emphasis in schools on testing, and the suspicion articulated both within the teaching profession and outside it (commencing page 35) against any assessment that appears to rely on subjective judgement. For the HODs interviewed, teacher assessment includes marking of printed output, marking of tests (where these are included), as well as making informal judgements based on observations and interactions with pupils. If the teachers do not undertake this assessment, there is no other mechanism readily available to all schools to do it. This mode of assessment is clearly internal in nature, although it could be anywhere else on the continuum of any of the other modes identified above.

## *Assessment of Output*

From the evidence of the interviews, there is still a reliance on the assessment of output rather than process. This form of assessment is usually formal, summative and terminal, but may be either internal or external. Reliance on this type of assessment is understandable because, as highlighted by Rowntree (1997), it is much easier to mark output for each pupil than it would be to ensure that there was sufficient time to explore the processes being undertaken by each pupil in a class in an attempt to judge their conceptual understanding of how ICT might help them solve the task they were set. As the HOD in Interview 2 suggests:

However, for reasons discussed elsewhere (commencing page 34), reliance on the assessment of output will only provide limited information. It may be that the process that is undertaken is more illuminating and interesting in terms of determining a pupil's capability than the marking of the output they have generated. Also, as indicated above (page 68) if the ability to justify choices that have been made is a key component of 'capability', it is vital that the pupil is given the opportunity to discuss their work in this way. In Doolittle's (2000) terms, the 'self construction of knowledge' may well tell the teacher more about the ICT capability of that student than any amount of printed output can.

In Interview 2 the HOD illustrated the problem of over-reliance on assessment of physical output:

> "I had a problem the other year with a lot of our KS3 teacher assessments were quite low, were down. When I was looking at them I was worrying and I spoke to my colleagues about it and it was the old, well they'd not printed it out yet. And I've had to change their opinion on that and thankfully now we look at DiDA, where they don't have to print it out, it's all electronic, erm, and it's a case of saying to my colleagues look it doesn't matter if you can't take the folders hope with you to mark the work, we can access their areas electronically and a lot of the units, in Y9 they do web units, web design and I don't get them to print it because it's never supposed to be printed."

This exchange illustrates the continued reliance on printed output for assessment purposes, yet the HOD is encouraging the use of alternate forms of evidence. However, it is still quite clear that the teacher is assessing output in the sense that they are working with the pupil's electronic files. The output is not hard copy printout of solutions, but assessment is still based on output from the pupil, rather than the process that they are undertaking. This illustrates a considerable dilemma for any assessment of ICT in that the assessment of product, whether 'hard copy' or electronic has been the traditional method of determining pupil performance in the subject. But, as Freedman (2007) indicates, the process by which the product has been formed is equally important and yet the means of assessing 'process' is nowhere near as well defined and established.

At the moment, there is no quick and easy way for a pupil to show their 'working out' of the solution in the way they would perhaps do with a problem in mathematics. There is a technical solution to the capture of 'working out' in that it would be feasible to record every key press that the student makes. Analysis of this may prove illuminating in that a record of every key that is pressed by the pupil may show that they immediately know how to undertake a particular task in instrumental terms; or it may just tell us that they copied the solution from somewhere else. What it does not tell us is the thought processes that the pupil undertook to arrive at the solution. The end of KS3 on-line testing system that was piloted in schools in 2005 – 2007 but has since been withdrawn used a mechanism such as this to assess a pupil's level of attainment. By implication, in this testing system 'efficiency' (that is fewer key presses) indicates 'capability'; so the pupil who immediately knows which keys to press to solve the problem is performing at a higher level than one who explores a variety of different options before they find the most appropriate solution. This illustrates a completely instrumental notion of assessment of ICT capability. The recording (measurement) of key presses provides a level of 'efficiency' – fewer key presses equals greater efficiency and greater efficiency equates to

higher attainment. Unfortunately, this assessment scheme fails to take notice of at least two significant points. Firstly, the office application software in common use throughout the world is programmed specifically to provide at least two and often more ways of performing a particular task. In some cases this is to preserve backwards compatibility with legacy systems, but more often it is to provide the user with a variety of means to solve a problem to suit their own preferences or learned experiences. Hence any assessment process that determines that there is one correct way of undertaking a task (or that one way is better than any other) is missing the point. Secondly, as we have already identified (commencing page 31) unstructured exploration and the notion of 'trying out options' can indicate a level of sophistication in problem solving that is exercising higher level behaviours than those illustrated by remembering which keys to press in a given situation. In an assessment scheme that relies on recording key presses, the complexity and subtlety of assessment of ICT capability is overlooked.

### *Observation Evidence*

In Interview 5, the HOD indicated that observation was used to provide assessment data, although the HOD then went on to describe the assessment of electronic output evidence as a vital source of information:

> "ML: … what other sources of evidence do you use?
> HOD: Well observation, what we've seen on screen because you can't print everything off can you?
> ML: Sure. And do you find that's a useful process, particularly for pupils who perhaps have gaps in printed work?
> HOD: Oh yes, well you've got to. I mean, but then again another thing we can do is get onto the students' own area, to check what they've got in their area. We do that an awful lot. We've got to, erm, especially with printers breaking down and everything."

This exchange is interesting in that initially, the HOD was keen to illustrate the use of observational techniques as a means of teachers assessing pupils. However, the HOD quickly moved on to highlight another 'product' driven method of the teacher examining the pupils' electronic files on the network. The explanation 'what we've seen on screen' does not help us very much in understanding the process that is being undertaken here. We can perhaps interpret what is happening as a process of looking at a pupil's monitor to see their work develop over a period of time and hence form a judgement about their ability to use ICT tools to solve the problem they are working on. However, it is by no means clear how teachers would record or capture the impressions that are gained in this process. Also, what happens if the teacher does not observe the vital breakthrough in the pupil's understanding where they quickly make real progress that moves them on in their task? Whilst it would seem that this observation process is a useful additional source of impressionistic evidence for the teacher, questions over its reliability and validity must still remain.

Trying to define what it is that the teacher is observing in this informal, internal, ideographic assessment method and how they are capturing what they see for assessment purposes brings us back to the central problem how we define capability. As Sadler (1989) suggests, each teacher's notions of what constitutes 'quality', or by implication in our terms, 'capability', are subjective and largely unarticulated. Hence the statement by one of the HODs interviewed, "… I just looked at it and said, it's a level 6 …". Those of us with experience of assessment in school can probably relate to this statement and reflect on our own examples

where we combined and focused our expertise and experience into a judgement such as this. However, what looks here like a 'snap' judgement masks host of underlying activity such as experience of professional judgement (possibly gained over many years), detailed knowledge of the context of the school, class and individual pupil, detailed knowledge of the subject matter and its assessment and so on. The difficulty is that such judgements are by their very nature highly contextualised and lacking in consistency and as Wolf (1993, p.16) argues 'intrinsically variable'.

### *The Use of Tests*

Even where mechanisms are being used to try and capture an assessment of the processes a pupil is undertaking, difficulties exist. One school (Interview 2) also used end of unit tests as a means of triangulating assessment data from other sources:

> "HOD: …we also use Goal Tests ...
> ML: OK.
> HOD: ... Erm, have you come across Goal Testing?
> ML: No.
> HOD: Erm, it's software.
> > HOD pulls up test on computer
> HOD: So these are NC progress tests that you can set, which are on-screen tests - nothing at all like the KS3 IT tests though. Erm, although it does try and individualise it in that with the NC tests you get 38 questions and the first 8 are sighting questions, so depending on what level the pupil's working at on those they'll then get ... So if it comes out L4, they'd get 10 L3, 10 L4, 10 L5 and it mixes those up and it randomises them as well so they can't see what the kid next to them is on and so on. Erm, but then, the information that gives out, if I just show you ...So, I've got one here ... so that will then, at the end of it give me some data and it also has them as CSV files, so I can literally copy and paste them into our curriculum records."

It is difficult to know without having a detailed knowledge of these particular tests what it is they are actually testing, but it seems very likely that, like the trials of the KS3 ICT on-line tests, the assessment would be based on a measurement of procedural competence displayed by the pupil in the sense that the responses (perhaps even down to the key press level) would be judged against a pre-programmed ideal contained within the testing system. This type of assessment is formal, summative, terminal, examined, product based and convergent. This 'convergence' was one of the biggest pedagogical criticisms levelled at the trials of the on-line testing proposed by the QCA. The test marked the responses by the pupil against an 'ideal' response. If the pupil chose to respond in ways that were at variance from this 'ideal', then they lost marks. This system gathered key press and mouse click data and used this as evidence of efficiency on the part of the pupil, so if an individual pupil initially opened a spreadsheet application when a word-processing application was required, they would lose marks even though they may have subsequently opened the word processing application to compete the task. As articulated above (commencing page 32), this approach to automated assessment relies on a very instrumental approach to a solution where variance from the pre-programmed pattern for the solution is penalised.

Of course, this difficulty is not confined to on-line testing procedures as the very public criticism of 'teaching to the test' in relation to end of KS testing at both KS2 and KS3 bears witness. However, if we accept the prevalence of the 'learning by trying' aspect of using computer technology proposed by Phelps, Hase and

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Ellis (2005), Selwyn and Gorard (2004) and Pearson (2005) (commencing page 31), proscriptive on-line testing systems such as these would seem at odds with the way in which many pupils use technology. So whilst we may understand the desire of the HOD to establish a tested baseline of attainment, we cannot be sure that the tests are providing a reliable and accurate picture of a pupil's ICT capability.

There is also an issue related to weighting of tested outcomes in some schools. One HOD in Interview 6 identified that there was a greater weighting attributed to the test in that:

> "… In the past, we've tended to allow the test to move them up slightly."

Here, the results from the test are being reified as providing a more reliable and valid measure of pupil performance than other means of assessment. In a way, this is perhaps understandable in that the educational system (particularly beyond KS3) in this country is driven by public examinations and the ultimate success of a pupil will be determined by how many qualifications they achieve before leaving school. In that case, the school in this example could be seen to be reflecting the reality of the importance of testing elsewhere in the system by paying more attention to the results from this test.  However, as indicated above, given that we cannot be entirely sure what it is these tests are measuring and also comments made earlier about the difficulties associated with single or atomistic means of determining capability, the weighting of assessments by the use of test results in this way would seem injudicious.

In other examples, schools are using more traditional 'pencil and paper' type testing. In this exchange, the HOD in Interview 6 identified how testing was used in their assessment regime:

> " HOD: …they also do an end of year test just after they do the KS3s, which we've written and we've changed it and modified it and, although the test isn't levelled in itself, it gets, it comes out as a percentage. And, really by previous practice and making comparisons, a bit like the exam boards look at grade levels, you know, to marry it across from year to year. We come up with a system whereby if they've come up with a certain percentage it's a certain level. Now I know it's not brilliant.
> …
> ML: So that's based on experience from ...
> HOD: Yeah, previous experience. But I'm trying harder to make sure that the modules that they do through the year which have been levelled are looked at properly as well in alignment. And we do, we tend to look at the modules and the test.
> ML: Right.
> HOD: But in the past, we've tended to allow the test to move them up slightly. Which may not always be the right way to do it, you know."

This illustrates how teachers still feel more comfortable with formal, examined, summative assessment techniques and that they imbue them with a reliability and validity that may be entirely spurious. As Harlen and Deakin Crick (2002) note, for these teachers summative assessment permeates all their assessment processes.

This type of testing can be useful for determining declarative type knowledge, although (as previously identified) it would only give a limited picture of what the pupil can remember on the day of the test, not what they might be able to do with the ICT tools available to them in a real context. However, as indicated in the exchange, the department (based upon experience) are attempting to align their test with NC levels. The
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admission by the HOD that this process lacks reliability and validity is interesting, although the whole exchange does illustrate the way in which schools are attempting to produce a pragmatic solution to their assessment of ICT.

### *Pupil Self-Assessment and Annotation of Work*

In Interview 1 the HOD illustrated how pupil annotation (both written and verbal) is used as evidence for the assessment of their level of attainment:

> "HOD: … for example this one here - I have annotated my presentation. Some of the children they tell me what they are but they haven't actually written it down so if they tell you, then we do …
> ML: OK, so, so you're quite, quite comfortable, and you're, in the department about saying, well if it's a verbal annotation ...
> HOD: Mm that's fine.
> ML: ... And they've talked about it ...
> HOD: Because they know what they're doing.
> ML: ... That's, that's adequate ...
> HOD: Yeah."

In the questionnaires, pupil annotation of work was considered by 65% respondents to be particularly important as a means of assessment. However, in the conversations with HODs in interview, it became clear (as illustrated in the extract above) that many pupils found the process of written annotation of work difficult. As Zoellner (1969) identified, this highlights the difficulty some pupils have in communicating their cognitive processes in words (particularly if they are asked to write them down). As a consequence some schools and some LA have produced a short template to focus pupil comments. As an example, one template I have encountered provides prompts for the pupil to write short sentences justifying the choices they made when deciding how to solve the problem; the changes they may have made to the work in progress and then expressing an opinion on how well they think they have solved the problem set (perhaps by indicating how appropriate their solution is for the intended audience). This approach to simplifying the annotation process is understandable in the light of a general reluctance by many pupils to write in an ICT lesson. However, the formulaic approach indicated in this example provides a number of difficulties that call into question its value as a process. Because the prompts are often the same no matter what the task, the responses also become identical. Pupils who are in any case reluctant to comment on their work use the same phrases each time for every separate piece of work. Also, their comments tend to be superficial. For example, they justify a choice of font or colour because it is their 'favourite', without any articulated consideration of whether or not it is appropriate for the task in hand. Hence, what could be a useful informal, process-based, divergent and nomothetic addition to assessment data, often becomes a formulaic response that does not necessarily reflect the understanding of the concept of audience of the pupil.

What seems to be emerging here is that if the process of pupil annotation of work is important, then pupils need to be taught to annotate effectively and teachers need to be trained in the most appropriate ways of encouraging this. At the moment it seems there is still work to do in this area although the emphasis placed on pupil annotation of work by the AfL Strategy will in time lead to improvements in the quality of pupil annotation across all subject in the curriculum.

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In the extract above, the HOD also indicated another difficulty with pupil annotation in terms of whether the pupil has actually written any comments on their work at all. In this case, the teacher was eliciting the response from the pupil verbally and these verbal annotations are used to indicate the understanding of the pupil. However, this particular practice brings with it other problems as will be identified below.

From the interview evidence, there was a much greater reliance on pupil self-assessment as a means of assessing their understanding than there was of the use of pupil annotation of work. The introduction of AfL techniques into schools has resulted in many schools using self-assessment sheets where the pupil is encouraged to judge their work against some criteria (usually adapted from NC Level Descriptors or Learning Outcomes for the lesson). However, once again there is a tendency for this process to be superficial and formulaic. The HOD in Interview 3 identified a typical process using self-assessment sheets that was happening to a greater or lesser extent in all of the schools interviewed:

> " … we get the pupils to fill those out themselves, so they're self-assessing themselves. At the end of each lesson they open up the levelling sheet, erm, and, if they understand something, they change the box to green and if they don't understand it they change it to red and then from that we can, erm, look at their work, look at what they think they should be getting and discuss that with them as to whether we agree with what they believe they've learnt etc."

The colours referred to in the above extract are often found in use in schools as a so-called 'traffic light' system. If the pupil is sure of an answer or concept, they use the colour green. If they are not sure, they use amber or orange, and if they do not know the answer or do not understand, they use the colour red. This idea has been used in the assessment sheets referred to in this passage as a quick and easy way to determine what pupils think they do and do not know or understand. The original idea started out life in the Primary School sector, but it has recently found widespread use in many Secondary schools. In one respect this is a good thing in that it is providing some consistency of approach between different phases of education, and in early KS3 classes it could be a useful technique to assist pupils in transition between one phase of education and another. However, there are also some difficulties with it in that any 'tick box' approach can lead to a rather simplistic approach to assessment. Also, self-assessment will need to be monitored closely in order to determine whether or not it is being carried out by the pupils appropriately (this point is further developed below).

In this exchange from interview 5, the HOD identified the difficulty that pupils can have in producing an accurate self-assessment:

> "ML: … you mentioned that you're using self-assessment and peer assessment, has that helped them in terms of their independence do you think?
> HOD: It does help, but, they tend to undervalue themselves, I mean, this is standard though isn't it, you know?
> ML: Mm.
> HOD: But yes, yes it does help. And, I mean if you tell them that this is level whatever they'll respond to that.
> ML: Have they become more confident and comfortable with that process?
> HOD: I think so. …"

This was echoed in the comments in this exchange from Interview 4:

> "HOD: So sometimes, not all pupils do justice to their evaluations in the way that they might."

No doubt, as the idea of pupil self-assessment gains ground in schools pupils will be come more comfortable and confident with the process and also more able to make judgements that are reasonable and appropriate. However, this type of assessment is still largely atomistic and highly contextualised, so, at best, it can provide only part of the picture needed to make an holistic judgement of a pupil's capability. It is, however, a process worth persevering with because as pupils progress into public examinations in ICT at KS4 and above, the examination boards expect candidates to be able to evaluate the effectiveness of the solution they have produced to a problem. From my own experience of teaching GCSE and A Level ICT, this element of the examination specification is one that older pupils struggle with. Hence, becoming more self-aware and self-reflective at KS3 would be a very useful developmental skill for later phases of education.

In order to ensure that the pupils are able to make a reasonably accurate judgement of their own knowledge and understanding, many schools have written statements for these self-assessment documents in language that is easy for the pupil to understand. This exchange from Interview 2 illustrates this:

> "HOD: There's a pupil friendlier version that they get to see ...
> ML: Right.
> HOD: ... That says, if I'm working at L4 I should be getting this. If I'm working at L5, I need to ...
> ML: How helpful is that?
> HOD: I think no matter what, no matter how pupil friendly you try and make it, if I just try and show you one of those sheets, at the end of the day, it's still I think giving the children ownership of that, it still depends upon their personal level, their own intelligence level ...
> ML: Mm, mm.
> HOD: ... Erm, because you try and make the language as simple as you can, but at the end of the day ...
> ML: Right, yeah, yeah.
> HOD: ... I think they still penalise the weaker kids. Erm, so this is what we would give them at the start of a unit. Just so they know ..."

The problem with this editing of the language of the objectives for the curriculum is that, in producing 'pupil friendly' versions, it is possible to lose any sense of the concept that the pupil is being assessed on. Hence the process becomes meaningless. Also, the HOD identified above that even with pupil friendly language, some pupils still do not understand the expressions that are being used. This is perhaps not surprising given that the discussion on pages 63 to 70 identifies a good deal of confusion over terminology and definitions among teaching professionals and also issues relating to the communication skills of the pupils in KS3. By trying to simplify the language used accuracy of meaning is easily lost. Wolf (1993 p.13) argues against greater precision of language and for a 'shared meaning' of terminology. Yet, it seems that a shared meaning is illusive among teaching professionals, even before any attempt is made to reach common understanding with pupils.

Additionally, as the HOD in Interview 3 identified, self-assessment can be inaccurate where pupils copy work from their friends in the class:

> " … in the conditions in an ICT room, it's very easy for a pupil to look at another pupil's monitor and, you know, copy or, so the work itself could give you a false impression of exactly what it is that they understand. Actually discussing what they've done with the pupil gives you a better idea of whether it was their own idea or whether it's an idea they've borrowed."

Thus, for the process to have any value, the teacher still has to moderate the self-assessment of the pupil at some point. This process of moderation is illustrated in this exchange from Interview 1:

> "ML: … do the teachers fill in something the same, or ...
> HOD: Yes.
> ML: Similar ...
> HOD: Very similar yeah, in fact it's the same.
> ML: OK.
> HOD: You take it in and then you say well no, they didn't do that so you cross it out ...
> ML: Yeah.
> HOD: ...Yes they did do that, so you tick it."

In Interview 7, the HOD suggested that self and peer-assessment can have a positive impact on the pupils:

> "I think it's certainly helping ... yes it does help with motivation and interest."

However, for this self-assessment to be useful, the pupils need to be taught how to assess themselves and their peers effectively, as this exchange with the HOD in Interview 8 indicates:

> "ML: … how do you find out whether a child is able to, to determine whether the work they're producing is appropriate?
> HOD: Well, because it's discussed and it's shown and people annotate their work you know annotate slides with handwritten notes or call outs with ...
> ML: So that process of pupil annotation is, is quite important in the capturing of data is it?
> HOD: It is, yeah. Yeah, and if they can do that they've, they've hit that criteria.
> ML: Has that been a struggle?
> HOD: Er, no I don't, no I don't think so, not for the, er, for *** who's taught it, because she's, it's taught as a, as a special skill isn't it, a separate skill which they then do and repeat through the first 3 years. …"

At best, it would seem that self-assessment can be seen as a form of triangulation of teacher judgements. It can be useful in highlighting some general trends (for example if all the pupils in a class indicated that they did not understand a particular concept), but it is questionable if the rather simplistic forms of self-assessment referred to in these interviews add a great deal to the teacher assessment that is going on except to confirm the teacher's own judgement.

It seems that the schools I have encountered are in the early stages of using pupil self-assessment in ICT. As a concept it is relatively new for most schools and they are clearly encountering some difficulties and problems with it. Until schools gain more experience with this way of assessing, and particularly until it becomes routine in the pupils' experience of their whole school life, it is likely to remain of little real use in the accurate and consistent assessment of pupil attainment in ICT at KS3.

### Teacher Annotation of Work and Pupil/Teacher Discussion

The HOD Interview 1 indentified how the process of teacher annotation of pupil work can add detail to the output evidence generated:

> " …sometimes on the children's work when we're marking it we just make a note of what they've said."

Usually, teacher feedback to pupils has a formative purpose designed to indicate to the pupil how best they can improve their work for next time. However, in this case, the HOD is indicating that teacher annotation can also capture detail for subsequent use in making a summative judgement of the pupil's attainment. This could be a valuable additional source of evidence to allow teachers to nuance their judgements and take account of particular informal, ideographic 'in the moment' conversations or observations that would otherwise be lost. The challenge with this approach is how to embed this in practice so that it becomes a systematic and comprehensive aspect of a teacher's activity. Without this embedding, this kind of activity is more likely to be occasional, haphazard and lacking in rigour. In these circumstances, use of this kind of annotation as a means of informing summative judgements will lack consistency, reliability and validity.

In Interview 2, the HOD indicated that their departmental tracking spreadsheet had space for the teachers to add comments to the assessment of an individual piece of work done by a pupil:

> "…you see we're able to put, in using a spreadsheet to do it, we're able to put comments on."

Again, this is a good idea, but when the HOD showed me the spreadsheet, there were very few annotated comments entered in to it. Hence as a technique, unless this method is used consistently and comments are annotated for all pupils, any judgements that are influenced by these comments will lack reliability and validity.

Following on from the previous point, according to the HOD in Interview 4, the detail of knowledge required can only be gained by individual conversations with pupils:

> "… I think it's very important, because, when you, when you're talking to pupils, then you get a clear insight into their thought process and things. And quite often children can talk better than they can write."

Furthermore:

> "HOD: So sometimes, not all pupils do justice to their evaluations in the way that they might.
> ML: So do you capture that? Er, do you have a mechanism for capturing that kind of oral dialogue that goes on where ...
> HOD: We have, er, class assessment sheets with, erm, key learning objectives which we can record on there as we go.
> ML: OK. So if a child's spoken to you about something and maybe they haven't finished their evaluation sheet, or they haven't perhaps articulated particularly well in their writing, but yet they've described to you exactly what you expected then that's a way of kind of ...
> HOD: Yeah, we can note it down."

The problem is one of capacity of the teacher to assimilate all these 'in the moment' encounters and then systematically record the exchange. Hence the teacher will need to have a clear picture of the level of understanding and knowledge of each pupil in the class which has been informed by these informal encounters. As previously indicated, not all teachers will be able to do this effectively, whether through lack of time, lack of training in the techniques needed, or perhaps lack of experience.

### *Gut Feeling and Experience*

A number of the HODs interviewed identified the role that experience plays in determining a level for an assessed piece of work. This relates to Gigerenzer's (2007) (page 41) point about how experience influences the assessment process. Typical of the responses was this from the HOD in Interview 1:

> "HOD: There was one piece of work I was given and I was asked what level do you think this is? And I just looked at it and I said it's a level 6.
> ML: Mm.
> HOD: Well how do you know? And, I mean, it was a level 6, but, I just know because of looking at work over the years."

This is an interesting comment because it illustrates a process that is going on where experienced HODs appear confident in their ability to level generated output from pupils based on the printed work, without necessarily seeing the process that has gone on that has produced that piece of work. No doubt these HODs are sincere in their belief that they are assessing work accurately when they do this, but it seems clear that there is a lot happening that is unseen and unexplained when teachers make judgements in this way and as Kruger and Dunning (1999) would suggest this would cause us to question the validity and reliability of this activity. What is it about this work that the HOD recognises as being L6? Is there some intrinsic 'L6'ness' about the hard copy of the piece of work in front of them; or is it something to do with a detailed knowledge of the pupil who produced the work; or perhaps it is about an in-depth knowledge of the task that recognises the complexity that has gone in to producing the final output; or perhaps is it a combination of all of these things? However, because the process being undertaken by the experienced teacher is largely unspoken, as Waks (2009) indicates, there is a rich complexity encapsulated in the experience the teacher brings to the assessment process. Yet, it is difficult to determine the full complexity of the multiple activities that go to make up the assessment judgement. Indeed, it may well be that the teacher themselves could not actually describe the full process even if they were asked to do so and, following Kruger and Dunning's (1999) argument, the teacher's own self-awareness may be poor .

Some HODs themselves expressed concerns about their own ability to make reliable assessment judgements as this extract from Interview 6 illustrates:

> "But I personally struggle with, you know, reading through the list of criteria and I think well what does that mean? I'm still at a stage where I think well what does that mean? What does that really say, what's it asking us to do? And I know like in Science and Maths especially they have like 5a means c, but I just don't feel I'm competent enough to say ... Yes I can say well it's a 5 and I can say whether it's a good 5 or a bad 5. So that's where we're at at the moment and I'm not satisfied with it."

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Interestingly this comment was made by a very experienced HOD who had been in post for a number of years and had been teaching for a long time. Whilst the actual meaning of what the HOD was trying to say here becomes rather confused, particularly at the end of the extract, the first two sentences are particularly revealing of a level of uncertainty over the reliable judgement of levels. If this HOD in this school is unclear of the meaning of the assessment criteria, what would that tell us about the assessment judgements being made in this school, and also how representative is this of HODs as a whole?

It is a similar picture when considering how confident the HODs were in the ability of their department to level work at KS3. Some HODs were very sure that they were right, others were nowhere near as confident.

The following extracts illustrate HODs who are confident:

> "ML: … do you feel that that's led to a greater confidence in, er, in the assessment process or, er, as a consequence of all the things that have been put in place for that, or not?
> HOD: I think it has yes, because we know specifically what different elements, what levels they are referring to …"                                                                 Interview 1.

> "ML: … do you feel that the things that have been put in place and the mechanisms you've developed yourself as a school, has that led you in a sense to a greater confidence in the levelling and the assessing that you're doing?
> HOD: Yeah, I think in levelling the materials and the stuff the kids produce, yes. But, I will be interested to see if somebody ... I'm confident that a child's work that I've levelled at a L5 is a L5 according to the descriptors that we have. I'm confident that, following the level descriptors somebody I think, following those is a L5 following those."                        Interview 2.

> "ML: … how confident then, erm, are you that the levels you're awarding at KS3 are, are appropriate.
> HOD: Sound. Well I, I am confident. We had an HMI inspection, er, not last November, the November before where they looked at it and he said he thought we were being a bit harsh with our levels. Because our KS3 results are lower than our GCSE results. But, in actual fact, I still don't think we are …"                                                                                          Interview 4.

Whilst these extracts are from HODs who are not so confident:

> "ML: … how confident are you that the levels that they're awarding are actually the ...
> HOD: ... Not very confident, not very confident, no."                                          Interview 3.

> "ML: … over the course of say the last 3 years, particularly since the introduction of, erm, of this strategy material, do you think that that's led, er, led you to a greater confidence in the levelling process?
> HOD: No, I wouldn't say that. No I wouldn't say that. Erm, I think, what would, what would help us all is if the levelling was written in to the units. We'd find it an awful lot easier that way. You know, if it sort of said it in large capital letters to achieve level 6 ... you know ..."
> ML: This is what you must do ...
> HOD: Because it isn't cross-referenced, and it is hard to, hard to do sometimes."
>                                                                                                   Interview 5.

"ML: … the experience of the, the last 2 or 3 years, has that, has that increased your confidence in the assessment process erm, or not?
HOD: No.
ML: Right, that's a very simple answer ...
HOD: No, I, I was much happier 3 or 4 years ago. I really was.
ML: So you think that, the, the material has er, sort of muddied the waters rather?
HOD: It has, yes it's distracted me and I, and ... but I feel that it's moved the goalposts. What I thought was a level 5 or 6 doesn't seem, doesn't seem to be the same any more and I, would you, would you agree with this about ... am I misunderstanding what's going on because ...
ML: Well I think there's been a redefinition of what the Government believes is a level 4, 5 or 6.
HOD: ... Yeah, yeah that's right and I'm a bit surprised."                    Interview 6.

"ML: So how, how confident then are you that as a school the levels you're awarding are correct?
HOD: They're ... I mean, they're ... they probably don't stand up to much scrutiny, I have to say they're very subjective."                    Interview 7.

This then becomes an issue of consistency. If the judgement is being based on the particular experience of one teacher, how can we be sure that the same judgement is being made by a different teacher who (inevitably) has different experience? In this exchange from Interview 5, the HOD illustrated how this is achieved in their school:

"ML: How do you ensure that one class is being measured consistently in relation to another?
HOD: A very experienced department, erm, all three of us have been teaching IT for some years now and we've got the ex-head of MFL and an ex-assistant head, but they've been IT for a long time and we regularly meet. So we don't have a problem."

In contrast, the HOD in Interview 2 illustrated some of the problems of achieving consistency across the assessments of a number of teachers within a department:

"… within even our department, much as we do moderate, and so on, it might be that that one child, like I say, I know she's been away, or I know something special about her, I'll give her a 5. Somebody else may not have done, you know ..."

This was also echoed in the following comments from the HOD in Interview 6:

"I'm not confident. I'm not confident. I've just done it by experience and I keep on doing it the same. Erm, and the criteria in the scheme of work, you know the orders, are not that user friendly even for a teacher."

All the HODs I spoke to referred to 'experience' as the vital feature of making sound assessment judgements. Again in Interview 2, the HOD illustrated how experience was also the key:

"… it comes out through your experience doesn't it. I can tell you with my kids. Through years of doing it, I remember those conversations."

In this extract, the HOD was also referring to the verbal exchanges that occur between teacher and pupil as a way of informing assessment judgements. In this case the HOD was remembering conversations that had happened with pupils that indicated their understanding of the particular task they were set.

In Interview 7, the HOD identified that the NC Level Descriptors have been constant for a long period of time and this has led to greater familiarity with the descriptors and hence a greater level of experience at using them:

> "ML: … would you say you have more confidence in the assessment process now than you did before?
> HOD: Er, I think we're more confident in deciding what is a level 4, 5 or 6. Erm, I don't think that's because of the strategy though. I think that's because we're more experienced. Erm, we've been levelling those same level descriptors since I can't remember when - late 80's early 90's? Something like that - I can't remember when it first came out now. Erm, ...
> ML: It's certainly a long time ago.
> HOD: ... Yeah and the level descriptors haven't changed.
> ML: Sure. So you, you, you'd put it down then to er, being more experienced in using the level descriptors and translating that into what that looks like in term of student work.
> HOD: Yeah, yeah."

If the key to making sound judgements is experience, it is important to identify the particular experience that must be acquired by beginning teachers to enable them to make judgements in this way, and also provide them with a means to acquire this. Again, it is not clear that there is consistency of assessment process here. In Interview 1, the HOD acknowledged this difficulty:

> "… it's not as easy for my younger teachers because they haven't got as much experience …"

The centralised training associated with the KS3 Strategy was extensive and comprehensive. However, there were only a limited number of places available at training events and each event concentrated on a particular issue or curriculum area, there were no 'repeated' sessions. The training model was called cascade training as the one or two members of staff who attended the LA training were then meant to return to school to 'cascade' the training they had received to everyone else in the department. Because places on the LA training were limited, it was usually the HOD who attended (understandably), and thus the HOD became responsible for training everyone else in the department. So it seems that newly arrived or newly qualified teachers were particularly dependent on their HOD or other senior staff in the department to provide them with advice, guidance and opportunities to develop the experience necessary to inform their judgements. In this exchange from Interview 4, the HOD indicated the difficulty of getting staff away on training:

> "ML: So, so have your non-specialist staff been on the training as well?
> HOD: Er, unfortunately, well he's only started this September in the school has this particular teacher and he hasn't been able to go on the training, no. So he's the only one who hasn't had the training. So he, he erm, he works with me.
> ML: Right.
> HOD: So, I monitor and give them guidelines as to how they decide on what level."

At least one HOD (Interview 4) had managed to get all the department staff to the LA training. This extract also identifies the mechanism used in this department to standardise assessments:

> "Now, to help us level we've all been on the LA training courses and we all moderate between ourselves. So at the moment, I've got an NQT and a non-specialist member of the department as

well. So each time they do a unit, then I mark with them the first few, so that they understand in that particular unit what makes a L5C or whatever, hopefully! And then they go away and do the rest."

New or beginning teachers are thus faced with a two-fold problem. Firstly they lack the experience of their senior colleagues and so their ability to carry out assessment (using any means available) is limited. Secondly they are receiving advice and guidance from more senior colleagues in the department that may, or may not actually help them to develop their understanding of what happens when an experienced teacher assesses a piece of work, particularly if the experienced colleague is unable to fully articulate the process that they undertake when they assess.

In fairness, the KS3 Strategy Team acknowledged this issue when they established the training events and they put in place opportunities for schools to moderate marking amongst themselves with the aim of achieving some consistency of levelling between schools. Also the LA KS3 ICT consultants when visiting schools were keen to ensure that mechanisms for moderating assessment were put in place within the school so that ICT teaching teams within the school were making progress towards a consistent assessment standard. However, in practice, schools often found difficulty in systematically applying these moderation opportunities.

In this extract from Interview 3 the HOD identifies the difficulty in creating opportunities for systematic moderation of assessments in a school with a small team of specialist ICT teachers.

> "ML: Do you then, across your different sets, erm in KS3, do you then, sort of erm, have chance to moderate across each other's teaching, so that one teacher is looking at the, kind of moderated results of another?
> HOD: In an ideal world that would take place, erm, I have, there's myself as HOD, I have one other permanent ICT teacher in place. Unfortunately I've got another 6 members of staff (that's not unfortunately ...) who specialise in other subjects erm, also 2 of those are senior management staff. Erm, it's very difficult to be able to get together at a convenient time to do these things. I mean, I always make it very clear that I'm always available and they can come to me but nobody seems to have the time. I mean I said this in September and I've yet to see someone come and see me to say I need some guidance with this.
> ML: In that case, how confident are you that the levels that they're awarding are actually the ...
> HOD: ... Not very confident, not very confident, no.
> ML: OK. And that's purely because you've got this disparate ...
> HOD: ... Huge expansion yeah. …
> ML: ... Range of staff, many of whom are non-specialists.
> HOD: That's right, and also the geography of the actual school itself, erm you know, to get from where I'm based to where another teacher is based is, is very difficult. You know, and also the actual ICT rooms themselves erm, are sporadically placed which isn't ideal. These are all things that we've identified and that we know need to be rectified."

## Conclusion

Despite a high incidence of traditional assessment techniques, schools are beginning to use more 'holistic' methods of assessment, although these methods are not yet fully embedded within practice. The composition of school ICT departments provides additional challenges for some schools where staff have not been trained in the latest curriculum developments, or where there are non-specialist staff teaching and

assessing ICT. The greater use of departmental moderation of assessment may provide easily accessed means of developing teaching staff in assessment techniques and practice. The provision of opportunities for staff training in assessment decision making would also assist in securing the accuracy and reliability of assessment. Systematic and rigorous mechanisms for recording assessments and then tracking pupil progress over time could be useful in improving assessment practice over time. The next section will explore this theme in more depth.

## *Tracking Progress and Keeping Records*

### Overview

All schools involved in this research are using mechanisms for recording pupil attainment and the assessment judgements that are made about individual pupils. Some of these mechanisms are relatively newly introduced, and are still to become firmly embedded in practice. All schools are aggregating assessment judgements in order to inform a 'best fit' approach to reaching an end of KS final summative level of attainment for each pupil. Some difficulties in ensuring a complete and consistent data set from which to perform this aggregation were acknowledged.  In some cases, these end of KS judgements are being influenced by factors beyond the specific recruitments of the curriculum with at least one of the schools interviewed using inflated end of KS assessment to encourage pupils to continue studying ICT at GCSE.

### How Schools Track Progress and Record Assessment Data

All the schools involved in the interviews used a variety of mechanisms for recording and tracking pupil achievement during the KS. Adapting Brooks' (2002) terminology, the schools are fulfilling their statutory requirements to report on pupil progress and to inform parents and carers or attainment and progress at least once per year. Less evidence was found of schools using records for formative purposes, although this could be because as Brooks herself implies (2002, p. 118), classrooms may generate large quantities of informal assessment evidence that is either too difficult or too time consuming to capture in detail. This research has not concerned itself with how records of pupil progress are used to inform other professionals outside the school, so this aspect of record keeping cannot be further commented upon. However, in the next section (commencing page 88) there is a limited consideration of the sharing of assessment data between teachers within the same school.

In terms of producing a summative judgement at the end of the KS, the most significant use of record keeping is as evidence of attainment, and so the analysis below will concentrate initially on this.

### Some of the Mechanisms in Use

Some schools are basing their record keeping on LA models which schools have personalised to a greater or lesser extent. Others are unique to the school or are based on commercially produced software. The HOD in Interview 4 illustrates this latter approach:

> " … we did have a spreadsheet on Excel, but this year we've got some software, erm, called Aim High which is a reporting and assessment software. Now, what we've started to do is er, the ex ICT coordinator decided he didn't want to teach any more, and he is now ICT admin, so he's set up a system that links SIMS to the Aim High and we put into a report in SIMS when they complete a module, the level that we've awarded them and then it gets merged into the reporting software, so we've got a mark sheet that tracks them from Y7 to Y9."

It should be explained that Schools Information Management System or SIMS is a proprietary school record system based on a database that has been bought by some schools. The system is highly configurable and designed to provide for all the record keeping requirements of the school. For our purposes, the system usually maintains records of pupils and provides opportunities for teachers to input progress or attainment data for individual pupils. Different levels of access are provided to individual members of staff according to a definable structure and need. In this way, staff can access pupil assessment records and add their own marks, but would not be able to access data of a personal or confidential nature unless their role required it.

A similar process to that outline above is illustrated in this exchange from Interview 5:

> "ML: OK, in terms of sort of day to day recording mechanisms, erm, how do you record all of this data?
> HOD: Mark books.
> ML: Right.
> HOD: I used to, well day to day always has been mark books, individual members of staff. I used to as head of department, collect all the grades, the termly grades on the laptop, I've got records going back. But, now we all, we're on SIMS and so I've even stopped doing that now because it's duplicating effort.
> ML: So, you're able to kind of use SIMS as a means of getting a complete overview of a year group for example?
> HOD: That's right, yeah."

This exchange illustrates some lack of clarity on the part of the HOD. Is the school using mark books, or SIMS? In some ways this is to be expected given that many schools are moving form traditional paper-based methods of keeping records to newer electronic systems and so there is still some overlap and duplication of systems in evidence. However, if as previously identified there is a place for the assessment of a pupil to use an holistic overview perhaps nuanced by the experience and intuition of the HOD or other members of the department, clarity and consistency of centralised record keeping within the department becomes much more important. Anything that suggests that departmental record keeping is haphazard or ill-defined might lead us to question the reliability and validity of the assessment judgements that are being made.

This is graphically illustrated in this example where an exchange from Interview 6 identifies that the tracking mechanisms are not always successful:

> "ML: … in terms of recording all of this material, you've got your cohorts of Y7, Y8, Y9. Do you have a sort of a central ... you're just about to show me ... you kind of record this all centrally ...
> HOD: I shall show you how it's meant to be done. It's not completed - I'll show you how it's meant to be done. Erm, yeah we, we keep doing this every year and we keep failing to fill it in every year. God knows if OFSTED checked it ... But I mean, erm, if OFSTED come at the time of year when it's not been done yet I can say well this is it, this is how it works erm, ... Because I'm not normally on this computer it's taking its time. The situation is I'm on my own ... well not on my own, I erm, the second in the department has gone travelling, gone off, well he's resigned. Erm, he's er ... we have a shared

area for staff ... erm ... right, year 7, year 7 2005/2006 ... bet this has got nothing on it ... there's the names, there must be something on it ... I don't believe it, I was looking at the year 9 the other day ... erm, we've had to do a list of gifted and talented now of course. This doesn't seem to be ... this is a bit weird because erm, I was looking at the year 9's only about 2 days ago. Oh, maybe it's in here ... I was just about to show off then ... it's got to be in here somewhere ... if I showed you an old one it ... This is an old one, even that's not completed you see, depending on who taught them. But you would be filling in here the levels for the different things that we've done. Erm, so this is the system that's meant to work, I'm sorry I can't find it. I mean that's how badly it was done.

ML: So, is this just like erm a kind of a recording mechanism, it doesn't actually do anything ...

HOD: Well I can get an aggregate from it ...

ML: Sure.

HOD: ... but we usually add the end of year exam as well. Erm, but yeah it's ...

ML: Erm, does a mechanism like that help you to track, erm ...

HOD: It's supposed to.

ML: Yeah.

HOD: It's supposed to track them from one year to the next."

This exchange illustrates one of the problems with a central departmental record of attainment for all pupils. If the record is to be any use, it must be kept up to date by all members of the department for all pupils. Clearly in this school, this isn't happening effectively! Again, it is possible to see evidence of confusion about the purpose of collecting assessment data (and possibly about the purpose of assessment itself) in this extract. On the one hand, the school is being asked to place great emphasis on the use of assessment data as a means of securing accountability, yet at the individual level, teachers clearly struggle to sustain that emphasis in practice. From another perspective, if the collection of assessment data in this way is meant to contribute to the tracking of a pupil's progress and is then used to inform target setting and planning for the future, this is clearly not happening effectively in this school. If this is typical of practice in other schools, it may, as James and Pedder (2006) suggest, provide a telling illustration of the difficulty schools are facing with the individualised tracking processes envisaged by the AfL Strategy. If schools face difficulty in recording summative assessment data, how much more difficult will they find the systematic recording and monitoring of formative assessment data?

Where the schools are using a centralised recording mechanism, they are recording individual pupil attainment in tasks associated with teaching units. Sometimes these were also homework tasks, but most schools were not giving pupils ICT homework at KS3, so usually the assessments that were being recorded were for work done in class.

The schools used self and peer assessment sheets to record the pupil's own perceptions of how well they had done in achieving the objectives of the task or unit. These were then moderated by the teacher and used to inform the teacher's own assessment. The use of self and peer assessment is emphasised by the AfL Strategy, but as identified above (page 78) the types of data being captured by these assessment sheets was generally very low level, 'tick sheet' type data, with very little attempt being made to source valuable indicators of knowledge, understanding or progress. This type of judgement was invariably left to the teacher to make.

## Aggregation of Data

In most cases, the aggregation of assessments over the 3 years of the KS was used to inform the award of the final overall level for the pupil.

Typical of the practice was this exchange from Interview 1:

> "HOD: The Local Authority actually devised some assessment sheets, and they did one for each of the KS3 units from the Strategy, apart from 9.2, 9.3 and 8.5. So, we use those and we put them into a spreadsheet where we track the children. So at the end of Y7 we can give them an aggregated level and then that's passed on through to Y8 and we're building on that. As far as the 8.5 assessment comes, we use a similar assessment of our own to the sheets, by picking out the levels of themes and then it's a tick box the children do, the teacher does as well. Then you come up with, erm, at the bottom, this piece of work shows aspects of level, whatever …
> ML: OK.
> HOD: … and then for each of these 'ticky' boxes, we've got that on the spreadsheet and we put yes or no, and then it's like a best fit.
> ML: OK, so, if, if a child, erm, at the end of the KS3 type time, comes up with a sort of a profile almost of ticks in certain levels, and, and then, it's a question of saying well, they got more in a level 5 ...
> HOD: That's right ...
> ML: Than they have in a level 6 ...
> HOD: So they're a level 5."

The above extract illustrates a common process that all but one of the schools interviewed was following. The aggregated marks gained by a pupil over the KS3 period were used to provide a single combined level at the end of the KS. The only exception was in interview 7 where the school was not aggregating across the complete KS, but only using assessment data from Y9 to determine the final end of KS assessment level:

> "HOD: … we have a database system, based on, it's an Access database system, which records pupil's levels. We started off recording every unit in Y7, 8 & 9, erm, and we found it was so time consuming by the time you've marked the work and then moderated it and then gone to the database to put it on it was just taking far too much time. Erm, and, by law we don't have to record all that, it was just over the top. Erm, so what we've done now is we've cut down that number of units to about 3 units per year, so for instance with the Y8, we're only recording on the website unit which is 8.2 I think? No. Mmm I think it's 8.2. Erm, 8.4 which is spreadsheets and 8.5. So we're only recording those 3 units. Erm, and although pupils go on to do other work after that, erm, our ... we also have to tie in with our reporting system so for instance the Y8, well, the Y7 and 8 reports are all done around about May, erm, so we make sure we've reported on 3 units by then. So the final unit of those years is not reported on. Er, anyway, so by, at the end of each Y7 and 8, we have a rough idea of each individual and what level they're at and it's recorded on this database. In Y9 that continues, we've got the 3 main units, 9.1, 9.2, 9.3. Erm, 9.1 is the main one we report on because that runs to Christmas, erm, and, because it's Y9 and they're choosing options, their full report actually comes out in February ...
> ML: And do the Y7, Y8 levels, do they contribute to that final judgement?
> HOD: Not really no.
> ML: So it's mainly based upon their Y9 work?
> HOD: Yeah.
> ML: Mmm.
> HOD: Erm, in fact, I'm saying not really, it doesn't at all, we don't look at, erm, previous year's levels.
> ML: Mmm.
> HOD: Erm, so in, in some ways, we're only recording levels in Y7 and 8 for parents ..."

The exchanges above once more illustrate that there is an emphasis on the assessment of 'product' and a lack of assessment of 'process' evident in all schools I interviewed. As Freedman (2007) notes, as the

assessment of 'process' is lacking, the overall assessment mechanism is limited. However, as identified by Sainsbury (1994, p. 7) because the concept of best fit is enshrined within the KS3 Strategy advice produced by the DCSF, this aggregation of assessment data is not only common, but formalised as an expectation in official documentation. It relies of the assumption that the whole final level assessment can be made up of an aggregation of the individual parts of the syllabus that have been assessed over the course of the KS. Whilst this is an understandable approach (and implicit within the statutory requirement to report one single level of attainment at the end of KS3), it is not without its problems.

As noted elsewhere (page 69), just because a pupil is assessed at achieving a particular level at one point in their KS3 career, does not mean that they can sustain that performance. They may do so, or indeed they may not. It is perhaps more likely that their attainment in that particular element of the curriculum will change over time, perhaps for the better, but more likely for the worse. Sainsbury (1994, p. 6) highlights the problem of defining the constituent elements of 'mastery' in a criterion-referenced system. It is likely that the best that can be said for any assessment of a particular task or element of the curriculum is that it represents a snapshot of what the pupil was gauged to have achieved on a particular day. Hence it is of questionable validity to use this snapshot perhaps two school years later as part of a summative assessment at the end of the KS. This comment by the HOD in interview 8 illustrates this point:

> "… overall, sometime within those units children will have hit those levels, but if they were asked to, to produce those, that same standard under test conditions say, I'm not so sure they'd be able to do it. Because, obviously you concentrate, within those units don't you, you concentrate for a number of weeks, a number of lessons on a topic, an aspect with a certain, with the learning objectives that go with it and, then you assess them at the end, and then at the end of that they go onto something else and they forget about it."

Also, is there a good alignment between the tasks that are assessed throughout KS3 and the awarding of an overall final level? Some schools appear to be good at meticulously recording individual assessments of tasks throughout the KS (whilst others are not), and yet the final level awarded is for a single number representing an overall level of attainment. Can we be sure that every element of the curriculum that goes to make up that final assessed level is given equal weight in school? In some of the schools interviewed, the answer is no. This extract from Interview 5 is illustrative of this:

> "… I can give you an example, we've just done 8.2 which is web pages - creating web pages yeah, and we came to level it last night and we discovered we'd only covered L4 because we hadn't done the L5 stuff. It just wasn't there."

In this case, the school has not covered the topic thoroughly enough to provide the pupils with the opportunity to attain L5 in this area of the curriculum. Thus if pupils do not have the opportunity to produce work that is capable of attaining L5, the overall aggregated level will not be a reflection of their true capability. This would suggest then that best fit practices, whilst in wide spread use, compound the lack of reliability and validity in the assessment process as a whole.

## Best Fit and Teacher Intuition

Linked with the previous point about aggregation of data, the schools (and indeed the NC documentation) talk about a concept of 'best fit' when determining the final level awarded to the child. Hence there is an element of teacher judgement at work here. It is not an automated process where the scores in the spreadsheet are added up to produce a final level, but there is scope to use more up to date assessment or to compensate for periods of absence by the pupil. This exchange with the HOD in interview 2 illustrates this:

> "HOD: … it may be that she was away for a unit.
> ML: Mm, mm.
> HOD: So hence, hadn't got it all filled in, but if I felt ...
> ML: How would you deal with that then?
> HOD: Well I would give her a 5 if all her other work was a L5 I would say right she's a L5 then ..."
> And:
> "HOD: Teacher assessment can compensate for when a pupil is absent. And lots of the sections of work we give the children, the same level descriptors are hit in more than one. So that if they are away, they do get more than one chance with a lot of them. It's just with things like control, where there's the one comment on control and monitoring …
> ML: Sure.
> HOD: ... that if they miss that module then they would miss out, but …
> ML: Mm.
> HOD: ... lots of the other ones are hit, and as well here, you see we're able to put, in using a spreadsheet to do it, we're able to put comments on …
> ML: Yeah, yeah.
> HOD: … so we could say because was absent for this, or you know …
> ML: Sure.
> HOD: So that helps us with that."

There are issues of reliability of assessment here. It is evident from this exchange that the department is taking a pragmatic view and using other sources of evidence to provide completeness of the data that will be used to make up the final assessed level for the pupil. However, this pragmatism is inherently unreliable. In that the same assessment decisions may not be taken for another pupil. If the decision making process is not replicable across pupils, groups, classes or cohorts, then the assessment is unreliable and thus open to question with regards to its accuracy and consistency.

As indicated by the work of the Northern Grid for Learning (2000), and supported by comments elsewhere relating to the 'capability' of teaching staff themselves, the use of 'intuition' in assessing ICT can lead to a lack of consistency across classes, cohorts and (particularly) across schools. Even where the KS3 Strategy team have put in place mechanisms for cross-school moderation of assessments, as will be noted later, the uptake of these opportunities has been limited. If schools are heavily reliant on 'intuitive' assessment of ICT, there is a danger that assessment is not reliable or valid. Notwithstanding the comments of Cronbach (1982), Bruner (1990) and Meadows and Billington (2005), it would seem misguided to place too much reliance on assessment techniques that emphasise intuition unless, as suggested by Kruger and Dunning (1999) a mechanism can be established that grounds the use of intuition in assessment within a set of clear guidelines or criteria that are effectively disseminated and supported. Or, as Waks (2008) suggests, the teachers work in an environment that supports their intuitive processes.

Another indication of inaccuracy is where 'best fit' leads to inflation of levelling as can be seen from this comment from the HOD in interview 7:

> "Erm, the other pressure that we have is people doing options. Erm, so, we are as generous as we can be with those levels. Erm, if we're in doubt whether it's a 4 or a 5, we'll give it a 5, because we want people to choose our subject at GCSE ..."

So in this case, the department has taken the deliberate step of being as generous as it possibly can with its end of KS3 assessment levels in order to encourage pupils to study ICT at GCSE. This then calls into question the accuracy of the end of KS3 ICT assessment being undertaken by this school.
Another problem identified by the HOD in interview 8 was where the school is not covering the complete curriculum within the ICT department and an element of the assessment of the ICT curriculum is being undertaken within another department. For, no doubt, legitimate reasons related to the expertise of a small staffing resource in the department, the control and monitoring element of the ICT curriculum at that time was being delivered within another department in the school.

> "… the only problem we do have is that er, is that the control and monitoring aspect is, er, has been farmed out to er, to the CDT team. Because the IT teacher wasn't happy doing that really, so that's fair enough, and they will level that when we come to do that."

In this case, the Design Technology department are both delivering and levelling the control and monitoring element of the curriculum. However pragmatic a decision this may be in the context of the school, it must however, call into question the accuracy and reliability of the levelling in this area of the curriculum. Are the Design Technology team in this school able to accurately level control and monitoring within the ICT curriculum? Is their judgement any better than the ICT teacher? Would a more appropriate answer not be to train the ICT specialist teacher in this aspect of the curriculum, so that the assessment is kept within the department? How reliably can 'best fit' be applied to the decision over the final assessment level if some element of the contributing assessment levels has been undertaken elsewhere?

## Assessment Data and Accountability

As Brown (2004), Tapper (1997) and Whetton (2004) indicate (commencing page 38), assessment is increasingly being used for the purposes of 'accountability'. Consequently gaps in the delivery of the curriculum become very worrying. If the curriculum has not been delivered in its entirety, how can the reporting of assessed levels at KS3 provide a consistent measure of the school's provision of ICT at this KS? If the evidence of the interview above is typical of a large number of schools nationally, then the reporting of levels at KS3 is flawed..

## Conclusion

Despite a range of well established techniques for recording pupil attainment and progress, evidence of practice in this research indicates a lack of rigour and consistency. When this is coupled with the requirement to aggregate attainment into one final level and the practice of producing best-fit judgements, the accuracy and reliability of KS3 reported data is questionable. Increasingly schools are coming under

pressure from assessment 'backwash' which has the effect of further reducing the reliability of the assessment judgements that are made. In that case, any measures that can be taken to minimise these effects and increase the overall accuracy of assessment must be welcomed. The next section examines what schools are doing to try to ensure assessment is more accurate and consistent.

## *Making Accurate and Consistent Judgements*

### Overview

The use of standard, centrally published resources for teaching the ICT curriculum at KS3 has some potential in ensuring a consistency of delivery. However, there are some significant and limiting issues relating to the material that has been produced by the KS3 Strategy Team and all schools are adapting these materials to a greater or lesser extent for their own context and circumstances.

Increasingly, schools are becoming more systematic in the way that they moderate assessment judgements. All schools involved in the research moderate within the school, but only a small number have taken the opportunity offered by LA teams to involve themselves in cross-school moderation of marking. The picture that is emerging is that schools are using departmental cross-moderation within the year group concerned, but there was little evidence of cross-marking except as a check for pupils placed at the boundary between one level and another. Despite the fact that LAs have provided some opportunities for cross-moderation with other schools, there is a reluctance on the part of schools to expose their assessment practices to scrutiny by colleagues from other schools. I could find no evidence of comparison of individual assessment of levelled work year on year. Schools do not seem to use examples of work from previous years to assist them to level the current cohort's work, except insofar as the individual teachers can remember the levelling process over a succession of years. What schools are doing is using the overall percentages of levels awarded from one year to inform expectations for the next.

### Means of Assuring Accuracy and Consistency of Assessment

One way of providing consistency within the curriculum (and by implication a greater consistency in assessment), would be to completely standardise what is taught. Ignoring for a moment the obvious pedagogical objections to this strategy, if every class at every stage is taught the same thing, then it should be easier to assess progress and attainment of pupils (particularly over time as experience and maturity of assessment increases). In a certain sense, the introduction of criterion referenced NC statements in 1988 could be seen as an attempt to 'standardise' the curriculum. However, as noted elsewhere, the NC statements are far from unambiguous and hence standardisation has not occurred. The introduction in 1998 of a QCA Scheme of Work (SOW) for ICT at Key Stage 3 represents a further attempt to provide a greater consistency of curriculum although by 1999 OFSTED still maintained that ICT teaching was below standard. The introduction the KS3 ICT Framework in 2002 was another attempt to provide centrally developed material that can be used for teaching ICT in any school. However, it should be noted that (with the exception of the NC Statements), none of these centrally produced teaching resources were intended to be statutory. Given the relatively recent publication of the KS3 Strategy materials, consideration within this

research was given to how schools were using these materials and what impact they may be having on the assessment practices of schools.

Also important in exploring the accuracy and consistency of assessment judgements is a consideration of the qualifications and experience of the staff who are teaching and assessing ICT. The discussion on page 43 suggests that more experienced staff have a greater maturity in the techniques of assessment and hence their judgement can be relied upon to be more accurate and consistent. However, the evidence from this research is that experience of assessment does not guarantee accuracy and that a number of departments are reliant on staff who have no ICT subject specialist qualifications to deliver and assess the ICT curriculum. The use of centrally produced Strategy resources has helped to give non-ICT-qualified staff greater confidence in their delivery of the curriculum content, but the lack of accessible training for all staff in the use and assessment of these resources indicates, as discussed on page 85, a continuing gap in knowledge of departmental staff and a training need that is not being filled effectively.

### *Use of KS3 Strategy Resources*

When the KS3 ICT Strategy was launched, as series of sample lesson plans and a range of lesson resources was also published by the (then) DfES. Although this material was never meant to become statutory for delivery in school, because it represented a perceived 'official' position, and also because there was a large investment in regional training to support the launch of each new set of resources, many schools decided (at least for the first academic year) to use the resources and materials straight 'off the shelf'. The widespread use of these materials could provide some confidence for us in the consistency and reliability of both what is being taught and, subsequently, what is being assessed. However, being centrally produced resources, the material is not without problems and, over a period of time, and in the light of experience of working with these materials, most schools adapted the resources to suit the specific context of their own pupils. As the following extracts indicate, much of this adaption was at a fairly superficial level.  In some cases, the centrally produced materials were deemed to be too 'difficult' and alternatives were sourced and purchased. In particular, the materials produced by the commercial company Leafline under the title of the 'Digit' resources were popular in some schools. This extract from Interview 1 is indicative of the type of adaptation and practice found within departments:

> "HOD: … we're not using the actual strategy materials, because sometimes we've adapted the context ..."
> …
> ML: … do you find that, that the materials as they were published really, contextually, needed to be changed to make them relevant to your classes.
> HOD: Yes, I think they were actually done for middle income children down in the suburbs of London. Erm, the mobile phone one for example, it was very difficult, because our filtering system filters out mobile phones ...
> ML: Right.
> HOD: ... For a start off, because of children trying to download things etc. etc. So that was no go. Erm, the charities one, well we don't do anything like that in school, so it was totally alien to them. So it was things like this that we had to change.
> ML: Have you looked at any other schemes? I'm thinking of ...
> HOD: Yeah the Leafline stuff. We use quite a lot of those. Again we're adapting some of those as well.
> ML: And do you find those more contextually relevant.

> HOD: They are yes. And we've used some of the ICT Matters stuff from Heinemann as well. Then one or two of our own that we were using before and we've just put the objectives into those."

As a word of explanation, the HOD in this exchange was referring to the way in which the school's internet firewall would prevent any searching for website material related to mobile phones and so the HOD experienced difficulty in providing contextual support to the Learning Objectives (LOs) in this unit. The point being made is that context, local practice and school policies and procedures in this school have meant that the published KS3 resources needed to be modified for use with the pupils over the long term. This is also graphically illustrated in the use of email correspondence in a number of the published Strategy units, when many schools did not make email facilities available to individual pupils within their school ICT provision and hence the ICT department did not teach the use of email application software to pupils. When the pupils encountered the ideas and concepts contained within these teaching units, they had no personal point of reference, or school-level ICT provision to support their learning in this area.

Similarly, in Interview 8, the HOD identified lack of realism as a problem with some of the material produced by the KS3 Strategy:

> " … some of the units are, are weaker than others aren't they, the way they've been produced they don't work in the real world."

This point is interesting in that anecdotal feedback from many schools identified the difficulty their pupils had with some of the contexts of the activities. The materials produced for the Communication: Text and Graphics module came in for a lot of criticism because they were set within a fictitious European town and the pupils were asked to produce leaflets, newsletters and other print materials to publicise this town. Many schools found this context rather false and indicated that their pupils had difficulty in relating to the scenario. This highlights a problem with any centrally produced resources, and, to be fair to the Strategy team, the resources were never meant to be considered as mandatory. However, the experience of many schools was that the training they received from their LA when the resources were released made it plain that they were expected to teach the materials as published for at least one year in order to be seen to comply with the ICT KS3 Strategy and to try out the resources.

Interview 2 illustrates that schools are using some of the resources published by the KS3 Strategy without alteration:

> "Yeah, erm, through, years 7, 8 and 9, the pupils work on sections of work which are loosely based around the framework. I say loosely, erm, certainly Y7 is pretty much as was given when they were sent, and each of those units we, erm, level separately."

There would seem to be a link between the level of confidence of the schools in their ability to assess ICT at KS3 and the willingness of the HOD to vary from the published materials. The more confident schools seemed to be more willing to incorporate other ideas and activities into their teaching, whilst the less confident ones were more likely to stick closely to the Strategy resources. Also, schools where there was a majority of non-specialist ICT teaching staff seemed more likely to follow the published resources and lesson

plans more closely. In a sense, this is no surprise in that one of the aims of publishing the KS3 ICT Strategy materials was to assist schools where non-specialist staff were teaching ICT. This point links closely to the issue of teacher expertise and qualification (page 46). Less well qualified and non-specialist ICT staff are more likely to depend on centrally produced resources and less innovative approaches to delivering the curriculum.

Where schools were using the strategy resources, the appropriateness of the level of these centrally produced materials was frequently mentioned. For example in Interview 7:

> "HOD: … we haven't changed them out of all recognition, I mean, it may get to that stage, but I think we're, sort of, we're still in a transition phase from ... we've certainly dropped skills teaching almost entirely, erm ...
> ML: Mmm.
> HOD: ...  We've tried to embrace the strategy units as being, er, well they should know what they're doing sort of thing, you know. Erm, we like the Y7 units, very much, there's a lot of good material in there. Er, the only one we don't like particularly is the 7.4 the spreadsheets one. Erm, Y8 units we are struggling with, with our children. Erm, ...
> ML: Why is that?
> HOD: They're pitched too high for us.
> ML: Right.
> HOD: The contexts are boring, some of them and the language used is ... and ... what they're asked ..."

In this exchange, the phrase 'pitched too high for us' was explained as meaning that the materials were too difficult for the pupils to deal with because the level of the language and the concepts being dealt with were too advanced for the pupils to access. This point is also highlighted in the following exchange.

In interview 2, the HOD identifies some specific issues with the Strategy resources:

> "HOD: … we found that the handling data materials that were produced were at too high a level quite quickly for some of our pupils ...
> … whoever was producing the framework materials was a little limited in imagination, or ran out of time or whatever, I don't know ...
> ML: Probably all of those.
> HOD: It's very dry isn't it?
> ML: It is.
> HOD: And I think, as they dive in with the football league, because obviously they thought this is good, the lads'll love it, but it's high level skills that are required ...
> ML: Yeah, yeah.
> HOD: ... In order to actually think about football results, you know and the maths involved is difficult for them."

In this extract from interview 5, the HOD identified problems with the adaptation of the resources for their particular school. They found it was easy to simplify the tasks, but not so easy then to provide sufficient extension for more able pupils:

> "ML: … have you found that erm, those objectives within the lesson, erm, that are set out in the outlines for the lesson, are they achievable in terms of what you're, what you're attempting to do?
> HOD: Not always. Probably we would generalise and say we simplified, erm, rather than extended. Well, and I suspect we should be extending, especially with the top sets because we're not getting the levels we should be doing. We need to put extra work in."

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In the same interview, the HOD identified a widely expressed criticism of the sample lessons provided in the KS3 Strategy. The sample lessons were devised to fit into lessons that last 1 hour and also on the premise that all pupils at KS3 would receive 1 lesson of ICT per week. However, most schools involved in this research operate a timetable of 50 minutes per lesson and in some cases schools are not delivering ICT every week, but choosing instead to deliver the ICT curriculum in 1 lesson per fortnight, or as part of a carousel of other lessons in the curriculum where pupils may get 1 term of ICT each year at KS3. Hence there is not enough time in the ICT lessons to achieve everything that is set out in the sample lessons:

> "… we've re-written er, I'm using the shortened ones, not the full length ones because we haven't got the time to fit that in. Erm, and I've re-written, we did the, I've forgotten the numbers, the spreadsheets we've done, just about as it went, the databases we've re-written and the control, our students just, they couldn't do it, it's too hard. They're not, they haven't got the experience. So I'm about to re-write them."

The HOD in Interview 6 was unequivocal:

> "HOD: … we've tried various activities from the strategy and, generally I've been very dissatisfied with the strategy.
> ML: Right.
> HOD: I think, I don't know whether it's the language which is used, or whether it's used for middle class kids, it just doesn't seem to suit our kids. A lot of activities do not suit our kids. I find that, you're doing a modelling problem for example with lower ability kids, and they can't even set up a spreadsheet."

Despite this widespread dissatisfaction with the strategy resources, only 4 out of the 55 schools who responded to the initial questionnaire indicated that they were not using the KS3 Strategy resources at all. Most respondents (43 out of 55) indicated that they were using the learning objectives from the strategy, and some of the resources but not all. Paradoxically, this indicates that, even though schools are not entirely happy with the centrally produced materials, they are still prepared to use some of them, and they appear to be using the learning objectives produced by the strategy team without any difficulty. However, the issues identified above would suggest that the possible benefit for increasing consistency of assessment across schools by using these resources is not being realised. The difficulties encountered by the HODs above in their schools would not suggest any confidence in the standardising potential of using these particular common materials to teach the curriculum.

### *Cross-Marking and Cross-Moderating*

One of the mechanisms that can increase consistency of assessment that has been emphasised by the LA teams over the past few years is the use of cross-marking and cross-moderating of assessments. The idea of cross-marking is that within the department (and sometimes across departments in different schools) teachers mark the work of each other's classes. Cross-moderation is where teachers within a department look at the marked work of each others' class, perhaps concentrating on pupils who are at boundaries between different levels. The same process can be undertaken between schools as well.
The HOD in Interview 1 illustrates both of these processes in the following extract:

"ML: ... Universally. Erm, how do you, erm, within your department, achieve a, kind of, consistency of levelling across the different classes that you have? How ...
HOD: Well ...
ML: ... Does that work?
HOD: ... We do it with regular meetings and sharing each other's work ...
ML: Do you cross mark?
HOD: No we don't, but we do look at each other's.
ML: So you cross moderate.
HOD: Yes.
ML: OK.
HOD: And, we've actually had 2 sessions, the county did some moderation work last year that we sent people to.
ML: And that was, erm, was that with other schools?
HOD: Yes.
ML: OK.
HOD: So we're actually looking at other school's work as well and finding levels for it.
ML: Did you find that a helpful process?
HOD: It was very helpful, yes."

In this extract, the HOD in Interview 7 describes the processes for moderating assessments within their department:

"ML: What is the kind of practical process then of actually awarding a level, do you all get together and do that, or does a teacher do that decision individually, or what?
HOD: The teacher takes that decision individually for their group erm, and we ... this is a very big school, you're talking about 300 kids in one year group. Erm, and what we do is we have a department meeting at the end of each unit so erm, er at that department meeting we'd be reviewing a 7, 8 and a 9 unit in one hour and that's all the time we can afford. And, I, what I do is I ask every teacher to bring 2 samples of work from each unit. Erm, and then we just pass them round the room, erm, and look at them and agree a level. I mean the last one we had, erm, most of the levels were agreed, erm and I can remember one I passed back to a teacher and I said, "I'm sorry, I don't think that's a 5, I think that's a 4. So and that's the kind of conversation we have.
ML: So that's like an internal moderation process.
HOD: Yes, yeah."

In Interview 2, the HOD describes the process used in their department to cross-moderate work at identified boundary levels:

"ML: How do you moderate then? You talk about moderating within the department ...
HOD: We sit down and have a meeting. Everybody marks all their work and then we'll say, bring a 5, bring a 4, bring a 3 for this unit of work and we pass them around and discuss them ..."

Also in Interview 2, the HOD makes some very interesting comments about the experience of working with other schools in an attempt to moderate assessments:

ML: … in the past you've been involved with groups of other schools looking at a kind of moderation of work. Erm, was that an LEA kind of sponsored thing?
HOD: Yes.
ML: How helpful did you find that?
HOD: The other schools didn't really take anything with them ...
ML: Right.
HOD: ... to moderate. Erm, so not particularly, perhaps would be more so now.
ML: Right, was that a reluctance do you think to kind of, a sort of a nervousness really about this whole issue? I mean it ...
HOD: I think what it, lots of the other leaders ... I was new in post when the framework was introduced and I also changed subjects, I was a maths teacher, so I think I cam at the right time, in

that there were no real schemes of work here anyway for IT, and they arrived and I though these are wonderful and I could really see I think, the vision and where they were going with them. Whereas lots of the other curriculum leaders are perhaps older and had perhaps got schemes of work that they had developed themselves and put a lot of time and effort into and didn't want to abandon it all. And I think they were short sighted in that they didn't see that the framework was trying to teach capability and they were still stuck in, we're teaching spreadsheet now, we're teaching word processing now, we're teaching ..."

The comment in this extract about the experience of the HOD is enlightening. Perhaps as this HOD suggests, more experienced HODs are 'stuck' in practices that are now becoming out of date and based (as the HOD implies) on skills-based or application-based ICT teaching. Or perhaps a willingness to share assessment data with other schools is more a reflection of the lack of experience of the HOD in this school who was faced with having to set up the department from nothing. The issue of experience of HOD is an interesting one. Within the interviewed HODs there was an even split between HODs with more than 3 years and HODs with less than 3 years experience in post. This was a deliberate strategy to see if the experience of the HOD had any discernable effect on the responses from the schools. It appears as if there is a difference between experience in post and confidence in assessing capability in ICT at KS3, although it may be somewhat counter intuitive. At least 2 of the experienced HODs interviewed (Interview 5 and Interview 6) appear to lack confidence with the KS3 Strategy and the emphasis on assessing capability in ICT. Whereas the HODs in Interview 2 and Interview 4 who had been in post less than 3 years were much more confident in the procedures and practices of themselves and their departments. This also links with the earlier point about the willingness of HODs to base their departmental teaching on non-Strategy materials. The more experienced HODs were more likely to use the materials without modification, whereas the recently appointed HODs were more likely to experiment with alternative resources. Although this does seem to run counter to the previous discussion (commencing page 43 ) about the importance of maturity and experience in the assessment process, it is important not to make too much of this however, as it could be more to do with the personality of the HODs rather than any actual difference between experienced and inexperienced HODs.

In this extract from Interview 4, the HOD makes the point that cross-moderation of assessments between schools is a time-consuming and costly thing to undertake and it is not something that is high on the list of priorities:

> "ML: Have you been involved in any kind of cross-school moderation with others?
> HOD: Only when we've been to the LA courses.
> ML: Right.
> HOD: I mean, it is sort, it is something that we've thought about, it's just one of those things that's lower down the ...
> ML: Mm. It's very difficult ...
> HOD: ...The priority list to be, to be honest. Well I have quite a few friends who are ICT teachers or coordinators and I know *** who has a friend who's also an ICT coordinator, so it is possible to do it, but it's matter of organising the time, because it means you've got to come off timetable, or you've got to do it at night, and there's, at the moment there's an awful lot of other things we've got to do first."

In the questionnaire responses, over 30% of respondents indicated that they used year-on-year comparisons as part of their practices in order to attain a greater consistency of assessment.

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From the interview discussion it seems that these year-on-year comparisons are being made at the cohort level, so for example the overall percentage rate of different levels of attainment is compared this year with that of last year, but there is little evidence of individual work being compared with examples of work from previous years. This may be because a particular class may have the same teacher throughout the KS (although this cannot be so in every case). If there is little sharing of individual data between teachers, this would suggest that the purpose of record keeping to facilitate communication with other professionals (Brooks, p. 117) is not well embedded in school practice. To some extent, this is understandable because the percentages of the year group cohort achieving various levels is used as part of the school's centralised statutory reporting to government at the end of the KS. Hence these figures assume a high degree of importance and a yearly comparison of overall attainment is part of the analysis that schools undertake. However, this cohort level comparison does not assist ICT departments in the quest for consistency of assessment. Indeed, it might even mitigate against such consistency as this extract from Interview 7 suggests:

> "ML: So how, how confident then are you that as a school the levels you're awarding are correct?
> HOD: They're ... I mean, they're ... they probably don't stand up to much scrutiny, I have to say they're very subjective
> ML: Mmm, mmm
> HOD: Erm, again, we're under pressure from the KS3 manager of, you have to get 80% above level 5 or 84% or whatever the target is. …"

Hence the department in this school was set a target for the percentage level of attainment of level 5 for its Y9 cohort. This target was based on the previous year's figure and an analysis of the school's overall KS3 target performance. When the department in this school then discovered that in that year over 90% of their pupils had been awarded a L5 for ICT, this was deemed to be impossible because it varied so much from the target figure.


## Conclusion

Although there is a widespread dissatisfaction with the centrally produced resources supporting the KS3 ICT Strategy, schools are still using the materials. It is as if the resources have become a 'de facto' standard and HODs feel reluctant to move to far away from them in case they become non-compliant in terms of delivering the curriculum. Even where schools are using alternative materials, this research suggests that schools are amending and altering materials without moving too far away from the scheme of work devised in the KS3 ICT Strategy documentation.

Clearly, schools are coming to terms with changing assessment practices within the national educational arena. As methods of cross-marking and cross-moderation become more embedded within whole school practice, ICT assessment practice will become more comfortable with the idea of opening up departmental assessment practice to both internal and external scrutiny and questioning. At the moment it seems that schools are reluctant to do this; probably out of a feeling of insecurity in their own judgements.

# Chapter 5 – Conclusions

In a national policy context that places an increasing emphasis on the importance of ICT within the school curriculum, a number of research questions were determined that formed the basis of the enquiry of this research.

In this chapter I intend to revisit each of the research questions in turn to summarise how the theory uncovered in the Literature Review (Chapter 2) relates to the analysis of research data undertaken in the Analysis (Chapter 4). Additionally, I intend to consider this research in the light of other research in the field to determine how the findings of this study contribute to the body of knowledge relating to assessment of ICT in schools and also assessment in general. Finally I will point forward to the future in terms of how this research could be carried on, what work could follow on from this study and identify possible areas of useful research that may have emerged during the course of this work.

As this research has progressed, the research questions initially posed have proved in some ways to be interlinked and circular. Consideration of any one of these questions is likely to be influenced by the findings relating to the others. However, in the discussion below each question will be considered individually to ensure that an attempt is made to summarise the findings from the research that relate to each of the questions in turn.

Within both the literature review and the analysis of the data, a major difficulty in defining the nature of ICT capability was identified. The review of literature in chapter 2 (pages 15 – 45) and the subsequent analysis of the research findings in chapter 4 (pages 61 – 99) constitute the central core of the discussion. The literature illustrates the difficulty in determining a universal and easily understood definition of 'capability'. As the discussion confirms, a universally accepted and agreed definition of ICT capability does not exist. Capability is a complex and multi-facetted thing. As a consequence, this research has found that many attempts by teachers to assess ICT capability lack consistency and a legitimate, comprehensive basis in theory. The research findings confirm this difficulty and, based on the findings of this study, there is a lack of commonality in terms of what schools consider to be capability. This has implications for the status and role of ICT as a subject in the school curriculum. If there is no accepted agreement on the boundaries of ICT knowledge, then schools will choose to place their own boundaries on that knowledge and, hence, on the ICT curriculum. The responses related to determining what schools mean by ICT capability formed a major part of the discussion in this thesis. This is an example of the circularity between the research questions (referred to above), because if schools cannot define what ICT capability is with any certainty and consistency, they will be equally uncertain about what it is they are assessing and then the whole KS3 ICT assessment mechanism at work in schools must be open to question. The discussion and analysis of school-based assessment of ICT capability commencing on page 63 confirms that there is a wide range of practice at work here and that HODs are often lacking in confidence in the consistency and accuracy of their departmental assessments.

Also problematic is the nature of the NC assessment itself. The original notions of assessment in the NC were based on criterion referenced measures (see page 23). In ICT this has led to heavy reliance on assessment of product and infrequent consideration of the process by which that product was created. In practice, teachers find it easier to mark printed output from a pupil than it is to assess how the pupil got to that stage, (see page 73) hence a potentially significant element of an individual pupil's ICT capability is not taken into consideration in many instances. Indeed, the work of Wolf (1993) would suggest that any attempt to assess the complexity of capability using a pseudo-criterion based assessment regime is doomed to failure. This reliance on output at the expense of process also limits the taught curriculum. By concentrating on ICT related tasks that result in output, schools are missing the opportunity to consider the more difficult concepts that underlie ICT knowledge and that cannot be easily captured through pupil generation of a product.

Another factor relating to this question is that much of the ICT assessment that is recorded at the end of KS3 is based on assessment data from earlier in the KS (for example see page 91). Hence the assessment is not undertaken at the end of the KS, it is reported at the end of the KS. As the discussion in chapter 4 (commencing page 92) illustrates, processes of aggregation, best fit, and the use of intuition are widely used to determine the final assessed level at the end of the KS. Whilst these practices are common among schools, it is difficult to see how a consistent and reliable judgement can be made by using these techniques. This also has implications for the nature of ICT as a curriculum subject. The lack of an holistic view of ICT knowledge with a spiral curriculum that revisits earlier knowledge and understanding and builds on them is a real danger of the approach identified in some schools where topics are covered and then assessed early in the KS, but rarely returned to thereafter. The 1998 QCA SOW for ICT did provide Y9 units of work that were designed to revisit and secure elements of the ICT curriculum covered in Y7 and Y8. However, according to the DfES (2004), few schools adopted these units into their curriculum and hence the opportunity to consolidate pupil knowledge was lost.

As indicated in chapter 2 assessment is a problematic area in terms of its validity and reliability (commencing page 21). If schools can show how they achieve consistency of assessment, this would perhaps provide confidence that, even if school assessment was not always entirely valid, it should be reliable from one year to the next and from cohort to cohort. It would not necessarily suggest that assessment was reliable between schools, and that would still provide a difficulty in a curriculum that is meant to be national, with the same standards across the country. The evidence from this research about consistency of assessment is mixed. Schools maintain that they act consistently, yet they are frequently unable to identify how they ensure this consistency. There is good evidence of moderation of assessment at work at one level – most schools are moderating their teacher assessments between classes at KS3 towards the end of the year. However, there is little evidence of year on year moderation (to ensure that the standards this year are largely in line with the standards last year), and virtually no evidence of moderation between schools – despite the efforts of LAs to encourage and mediate this (see discussion commencing page 9828). A recent review by OFSTED on the impact of the National Strategies suggests that this situation may be improving over time (OFSTED 2010).

This would lead to a conclusion that the validity, reliability and consistency of ICT assessment may be questionable, but, as schools become more confident in administering these assessments each successive year, the overall picture is improving.

Are the current assessment methods being used reliable? Simplistically, the answer to this question is no. The discussion of validity and reliability in chapter 2 (commencing page 21) indicates the main issues surrounding assessment and its validity and reliability. However, this research indicates a greater complexity at work here. The lack of clear definition of what is being assessed, the lack of consistency of judgements against (often ill-defined) criteria, the reliance on internal moderation and reluctance to engage in external moderation activities would indicate that the validity and reliability of ICT assessment at KS3 is poor. However, these factors are not unique to ICT assessment. Assessment of most of the subjects in schools could be subject to the same criticism. The introduction of centrally assessed standardised tests for all subjects is not the answer either. Whilst central testing may be more reliable and consistent, it is not necessarily more valid. The introduction of centrally produced resources and lesson materials from the KS3 ICT Strategy illustrates this point as the discussion in chapter 4 (commencing page 95) indicates. Also the attempted introduction of an on-line test for the end of KS3 ICT and the abandonment of end of KS3 testing altogether illustrate that national testing of this type is difficult to control and administer and of questionable value.

What is needed is a different view of reliability. Considerable resources and attention have been directed at schools over the past decade to improve their assessment processes. The introduction of AfL has added a range of assessment techniques that schools are becoming more comfortable with and are embedding in their whole-school practices. These techniques have a use in summative as well as formative assessment events. It is by means of this greater emphasis on and attention to assessment that more reliability of assessment will be achieved. If schools can be encouraged to share their assessment results with each other, then the moderating effect of this will produce a more consistent measure of pupil progress and attainment. The disconnection of end of KS assessment from the standing or value of the school would undoubtedly encourage greater openness in this respect.

The main concern of this research relates to summative assessment and, in all cases, the schools involved in the study were fulfilling their statutory obligations to assess at the end of KS3 and then report that assessment to government and parents. A wide variety of assessment techniques were being used, although a number of schools were using some form of traditional testing to triangulate their teacher assessment (see page 75). The main assessment technique in evidence from this study was marking of printed output of some kind. The literature in chapter 2 (commencing page 34) illustrates some of the difficulties associated with this, although all schools involved in this research were using assessment of product as a major constituent of their assessment. Teacher observation was also widely used (see for example page 74), particularly by the more experienced teachers – the discussion in chapter 2 (commencing page 40) summarises some of the main issues relating to making assessment decisions based on (often) transitory evidence.

In chapter 2 the notions of assessment 'backwash' and 'high stakes' assessment are discussed (commencing page 38). There is some evidence from this research (chapter 4, commencing page 93) that schools are using the end of KS3 assessment of ICT for purposes that go beyond the reporting of pupil progress and at least one department may be over assessing ICT at KS3 in order to encourage pupils to study the subject later in their school careers (see page 93). This was not a widespread finding, but out of the nine schools interviewed, one HOD acknowledged this practice.

Although this research is primarily concerned with the summative purpose of end of KS assessment, there is a growing emphasis in the literature (commencing page 37), and also being driven by the introduction of the AfL Strategy in 2008, for schools to use formative assessment techniques to support learners' progress. This is a different purpose of assessment. During this research I found evidence that schools were using these techniques, although they were not yet embedded in practice. There were some good examples of use of formative assessment, but more often these methods were being applied in a rather instrumental manner (for example see page 78). As a consequence the proposed benefits of formative assessment were not yet evident across the schools involved in this study. However, since this research was undertaken, there has been continued emphasis on AfL techniques in school, so the situation and systematic application of these techniques may now be more evident. As AfL techniques become more embedded within practice it is likely that this form of assessment will have a considerable effect on the ICT curriculum as it is delivered in schools. Certainly that is the intention of the increased emphasis on the use of these techniques.

The evidence from this research of systematic and wholesale training and development of ICT departmental staff in terms of both subject knowledge and how to assess the curriculum is limited (page 69 and 85). There is some indication (page 82) that as staff develop greater experience and maturity in the application of assessment techniques they become more confident in the accuracy and reliability of their judgements although in some cases interviewees reported the opposite effect (see page 82). This raises important implications for the training and professional development of all ICT staff in schools.

A number of schools involved in this research are reliant on non-specialist staff to deliver and assess the ICT curriculum. There are implications for the level of specialist knowledge of these staff (see page 69) and so the training and development of these staff becomes an important issue if they are to continue teaching and assessing ICT.

By implication, the point about training of staff raised in the two paragraphs above also applies to the initial training of student teachers. If training and development of ICT teaching staff in schools is lacking, then a greater emphasis on assessment of ICT and the pedagogic knowledge needed to teach ICT effectively is required in teacher training courses.

In the section below, I consider the implications of these findings in terms of pedagogy; assessment practice and departmental organisation.

## *Implications for Practice*

During the data analysis, a number of implications have emerged. Some implications relate to pedagogical matters, some to assessment and others are more related to the way in which departments organise their business. There is a good deal of inter-relation between these categories, although the implications within the categories will be discussed separately below. Whilst these points are discussed in the context of ICT, there are a number of places where the point could equally be applied to other subjects in the school curriculum.

## Implications for Pedagogy

Pupils appear to lack understanding of underlying ICT concepts. In some ways this is understandable, given the relative 'newness' of ICT as a subject in the school curriculum. Also, given the pace of development of ICT in general, some concepts that may have been important in the past may not be so important for the future. However, too much current ICT teaching focuses on teaching software application skills and neglects the conceptual basis upon which software applications are built. Any progress that can be made by the ICT profession both within and outside of education to define a universally accepted concept typology would be a useful addition to the ICT curriculum in schools. In the meantime, particular attention should be paid to the importance of how ICT networks permeate every aspect of the use of technology. At the school LAN level, network structures and the implications for the general user are not well understood, and beyond school, many pupils are connected through technology to extended mobile networks without a clear understanding of what 'connectedness' means. This latter point links directly to current debates about on-line safety and security of young people.

This is linked to the last point. There is some evidence that some teachers of ICT have a tenuous grasp on the core subject knowledge of the ICT curriculum. When the curriculum changes as it can when new GCSE or Post 16 qualifications come into being, a lack of knowledge of a particular software package can be understood, and most teachers in this subject are well aware of the necessity to keep themselves up to date. However, the continued reliance in some school on non-specialist ICT staff means that there is a potential gap in knowledge. This is often exacerbated at KS3, where non-specialist staff are frequently used because the specialist staff are already fully committed teaching KS4 or Post-16 examination groups. A greater knowledge of how many non-specialist staff are employed teaching ICT and then an understanding of where the gaps in subject knowledge may be would be a useful development in the future. In addition, more consideration should be given to in-service training of staff in new and emerging technologies (whether qualified ICT teachers, or non-specialist ICT teachers). This training should also include training in the pedagogical developments and innovations most relevant to the ICT curriculum.

There is currently much emphasis within schools about independent learning, although in the ICT domain, this independence has become synonymous with pupils making decisions without reference to teacher guidance. This has been encouraged by LA consultant teams and KS3 Strategy advisors through their

emphasis on L5 ICT work being distinguished by pupil activity and decision making that is not guided by teacher input. However, in contrast, a great deal of teaching of ICT is still situated within an instruction-led pedagogy. If ICT teachers are to develop more independence in their pupils, then more opportunities must be provided within the curriculum for pupils to work independently, to explore through trial and error and to engage in problem solving activities that challenge understanding rather than relying on repetition of pre-learned routines.

Because of the way funding for ICT was introduced into schools, most schools provide Microsoft Office<sup>©</sup> Application Software as the only choice of software to their pupils and staff. The teaching of ICT thus becomes 'locked' into the teaching of one proprietary range of applications. This encourages the acquisition of software specific skills and mitigates against the exploration of different ways of achieving a particular task. Although some evidence of alternative software is becoming more widespread through examination courses such as the Diploma in Digital Applications (DiDA) that introduces web design and multimedia applications to pupils, evidence from the experience of the pilot KS3 testing is that pupils are still generally poor at using unfamiliar application software. This point is closely linked with the point above about understanding concepts rather than remembering key presses. Exposing pupils to a greater range of software is likely to be beneficial in developing their independence of action and learning.

The current ICT curriculum encapsulates some very useful concepts that go beyond ICT and impact upon the wider school curriculum. However, the emphasis on discrete ICT lessons in schools often means that the potential for these concepts to be applied across the curriculum is lost and students do not appear to make the connection between what is learned in ICT and how it can be applied elsewhere (and vice-versa). Finding ways of making connections between ICT and the wider curriculum would enhance the learning of pupils and encourage greater flexibility.

The introduction of AfL into school is encouraging a greater use of pupil talk to explain their understanding of what they are learning. For the ICT teacher, a greater emphasis on this would be a good way of accessing the process by which a pupil has arrived at a solution. From a pedagogical point of view, this would provide a greater insight into what has been learnt than marking printed output could achieve alone. However, techniques such as this are time consuming and can be difficult to manage in a busy classroom. Certainly the current practice of allowing only one lesson to cover particular learning objectives would be challenged by this approach.

The widespread adoption of the KS3 ICT Strategy materials during the last decade was perhaps a necessary phase for the development of ICT as a curriculum subject across the country. However, it could also be said to have stifled the development of the curriculum in some schools for a number of years. The potential for standardisation of content to produce more consistent assessment is attractive, but according to the findings of this research not realised in practice. The implication is that school will always wish to adopt resources and materials to their own context and circumstances. Unfortunately, from the evidence of this study, this adoption has often been limited and trivial, and the schools are expressing dissatisfaction with teaching

materials that they have the power to reject if they so wish. Certainly, the new KS3 curriculum (introduced in 2008) places much greater emphasis on schools using their own initiative and creativity to define the content of the curriculum. However, it is beyond the scope of this research to determine how well or to what extent schools are embracing this challenge.

## Implications for Assessment Practice

At the moment, it is difficult to establish how well all teachers of ICT have been trained in assessment. The evidence from this study suggests that some members of departments have been trained and then they are given the responsibility to pass this training on to everyone else in the department. The KS3 Strategy has employed 'cascade' training techniques, where one or two people in the school are trained and then expected to take the training back to the school to disseminate the messages to all staff in the department. As Blois noted in her written memorandum to the House of Commons Education and Skills Committee in 2002:

> "Cascade training is very limited and teachers need an entitlement to direct access quality CPD during working hours supported by supply teachers who are well trained and valued."
> House of Commons (2003, p. 20)

Hence there is a question over the quality and value of the training methods used by the KS3 Strategy team. If the training is not being disseminated effectively to all staff, then it is not surprising that teaching staff find the application of new approaches to assessment difficult to put into practice.  If we seek to improve the overall assessment practices of schools, being systematic about delivering high quality training is one way of achieving this. It is perhaps a pity that, once the roll-out of KS3 Strategy materials had finished, LAs stopped the centralised training events that brought many schools within an authority to share in training together.

Assessment against the pseudo-criteria of the NC ATs encourages instrumental approaches to assessing that rely on product and ignore the process that the pupil has undertaken. A greater use of more holistic methods of assessment that incorporate how the pupil has arrived at a solution as well as what the solution is would enable teachers to access a rich source of assessment evidence that currently is largely overlooked. The key here is time for teachers to do this effectively. Time is always a problem when there is an imperative to deliver the curriculum. Of course, there has to be a curriculum in place, but the three years of KS3 should provide plenty of time to cover the curriculum objectives fully and still allow time for the application of holistic assessment techniques.

To ensure that the more holistic assessment referred to above has reliability and consistency, opportunities should be provided for teachers to join together to share their judgements. In this way, common understanding of judging evidence from a variety of sources could be facilitated. What seems to be stopping this at the moment is the sensitive nature of assessment judgements brought about by assessment 'backwash' effects.

Although there is no longer any possibility of a specific ICT on-line test at KS3, this point is illustrative of assessment practices that encourage teachers to asses only what they know the pupils can do successfully. Hence the assessment process is driving the curriculum, rather than the other way round. In this environment the validity of assessment becomes questionable. Ultimately, the way to prevent teachers teaching to the test is to do way with testing! However, given the fundamental importance placed on testing by our education system in this country, this seems unlikely. At KS3, perhaps what can be achieved is to minimise the overall importance for the school on the end of KS3 assessment. Again, the current 'backwash' surrounding assessment data is encouraging poor assessment practices.

As the application of AfL techniques becomes more secure in schools, effective annotation by pupils and greater self-evaluation are likely to become embedded in whole school practices. However, teachers need to also encourage and value the self-assessment of pupils in their practice. Departments will need to assume responsibility here to ensure that a whole-school approach is being taken and that the lessons learnt in one subject are not being undermined by practices in another. This point links closely to the departmental implications discussed below.

The evidence from this study suggests that whilst departments see the value of teacher annotation of pupil work, they do not systematically carry it out. There is of course an implication that, where teacher annotation is fully embedded in practice, much greater quantities of assessment evidence will be generated. This has an impact on teachers' time and workload. It also complicates the current assessment regimes in that such annotations will provide a qualitative measure of progress and attainment that is more difficult to analyse that a simple mark. However, such annotations allow teachers to capture 'in the moment' events which otherwise are likely to be missed or forgotten. These events can prove highly significant in determining a pupil's understanding or progress.

The potential for cross-moderating of assessment judgements in improving reliability and consistency of judgement is not currently being realised. Despite good attempts to encourage this sharing of judgements, little evidence was found of schools capitalising on these opportunities. At local levels, schools generally have good working relationships with their near neighbours. A renewed emphasis on using local school links to consider moderation of teacher assessments would be welcomed. Once more though, the sensitivity of assessment and its 'backwash' are likely to discourage this valuable activity.

## Implications for Departmental Organisation

Within departments maintaining centralised records can be difficult. However, given that the end of KS assessment in Y9 depends on judgements that are often undertaken in Y7 and Y8, some form of reliable central record is vital. The evidence from the schools involved in this study is that such record keeping is haphazard and incomplete. This conclusion is supported by the latest OFSTED Report into ICT practices in schools (OFSTED 2010). Hence the aggregation of evidence upon which to make an end of KS judgement on a pupil becomes more problematic. One way to ameliorate this problem is to ensure that the Y9 curriculum fully reflects and assess the totality of the KS3 ATs for each pupil. Unfortunately, the lack of

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uptake of the 1998 QCA Y9 units of work illustrates a gap in the way most schools secure the curriculum at the end of the KS.

The issue of resisting 'backwash' effects is probably beyond the reach of departments and indeed schools. For as long as end of KS assessment results are used to judge the quality of schools and hold schools to account, there will be too much pressure on the assessment process to resist. However, the evidence in the study suggests that, even given the 'high stakes' nature of end of KS assessment, many schools are producing teacher assessment that appears at great variance from the comparative tested results of the core subjects. In some cases, schools appear to be significantly under-performing in ICT in comparison with their tested performance elsewhere. Whilst this could indicate that the teaching of ICT in that school is not adequate, it could also indicate that assessment is lacking in reliability. Given that the use of KS3 assessment results as a means of school accountability looks likely to remain for the immediate future, schools, and particularly departments should do everything within their power to ensure that their teacher assessments are accurate and reliable. Otherwise they are misreporting and potentially mis-selling themselves.

## Summary

Given the way in which assessment is being influenced by AfL in the current climate, one area I would highlight is to encourage a greater use of assessment of process in ICT rather than always relying on the assessment of product. The discussion in chapter 2 (pp. 33 – 35), could provide a significant pedagogical shift in the way ICT is taught at KS3. If teachers can extract themselves from an imperative to 'teach to the scheme' and assess what is produced at the end of every topic or lesson, perhaps this liberation could enable pupils to more effectively acquire Kennewell's (2000) five key components of ICT capability (chapter 2 p. 19).

## *How this is an Original Contribution to Knowledge*

This research has been undertaken at a time of significant change for ICT practitioners in schools. Although a large number of studies (for example the 6 projects undertaken as part of the pan-European Impact Study between 2002 and 2006) have considered the contribution that ICT can make to learning, few, regional, small scale studies of ICT practice in schools in England have been undertaken in the last decade outside of the routine reporting system set up by OFSTED. As such, this study provides a unique insight into the way in which secondary schools are carrying out assessment in ICT at the end of KS3. Although limited in scale and regionally contextualised, this research has confirmed concerns about assessment practice identified in the literature and provided new insight into a long-running debate over 'capability' based assessment. Even though this research is regionally based and small scale, the variation in practice that has been found between schools and the lack of confidence that schools report in their summative assessment practices would suggest that this regional case study highlights a wider national problem; one that may also go affect other subjects in the curriculum.

The theme of capability has been central to this thesis although no consensus from either the theoretical perspective of the literature, or the practice identified in schools has been determined. Capability in ICT remains an undefined and illusive notion. This has implications for pedagogy in ICT as well as assessment of ICT in schools. Because there is no common agreement over what ICT capability actually is schools are delivering an ICT curriculum that largely fails to capitalise on recent innovations of technology and that is not effectively equipping pupils for their use of technology in the wider world. The reliance on output driven assessment methods is exacerbating this and hence methods of assessment are driving the curriculum. Despite recent attempts by the QCA (2007) to 'free up' the ICT curriculum and provide more scope for teachers to innovate, the statutory NC statements still remain vague and the statutory requirement for schools to report end of KS3 ICT levels remains a barrier to innovative curriculum development. This research suggests that the 'backwash effect' of reporting assessments exerts a powerful influence over school practice.

Recent research into assessment has focused largely on Assessment for Learning and the formative assessment that is undertaken in schools. This study has considered formative assessment techniques, but only insofar as they can be applied to facilitate a summative judgement at a point in time. Given the recent emphasis on formative assessment, it may be that further development and embedding of formative assessment methods could provide schools with a more appropriate means of assessing pupils in terms of securing their development and progress. For this to happen, what will be needed is a revision of the traditional views of reliability and validity in assessment and a move away from summative assessment as being the only measure of attainment that is given value both inside and outside of schools.

In addition, this research provides a timely consideration of summative assessment at the point at which summative judgements are still firmly embedded in school practice, but are coming under increasing criticism in the light of changing opinions and attitudes brought about by policy initiatives that emphasise formative assessment over summative. However, it is clear from this research that the practice of summative assessment of ICT in schools is inconsistent and, in some cases incoherent. As the assessment of ICT is grounded in teacher assessment (rather than testing), this calls into question the practices of teacher assessment across the whole curriculum. If the evidence found in this research of inconsistency and lack of coherence of ICT assessment is replicated in other subjects in the curriculum that rely on teacher assessment (currently at KS3 that includes all subjects with the exception of RE), then it is possible that all KS3 assessment lacks accuracy and consistency. Hence any notion of national standards for subjects at the end of KS3 is potentially a fallacy.

This research raises a number of implications for the training and development of teachers (both in-service and on initial teacher education courses). The lack of a clear subject pedagogy for ICT is largely due to its relatively recent introduction into the school curriculum. However, the existing ideas held by some teachers of what ICT consists of reduces the ICT curriculum in some schools to skills based drill and practice exercises that not only fail to capture the interest of pupils, but also consign the subject to an increasingly

outdated and constricting domain of knowledge. For ICT to develop further as a school subject, more pedagogical innovation (such as that proposed by Woollard (2005) is needed.

## *Recommendations for Further Work*

A number of possibilities can be identified for further work relating to assessment and the ICT curriculum in schools.

The introduction of a new KS3 curriculum in 2008 provides the potential and encouragement for schools to approach the curriculum in new and innovative ways. As this curriculum settles down, it will be interesting to discover what impact this has on the way in which assessment is carried out.

In the same way, the publishing of the Assessment for Learning Strategy in 2008 has emphasised the importance being placed on formative techniques of assessment. Further consideration of the impact that these techniques can bring to bear on summative assessment opportunities, particularly as these techniques become embedded within school assessment practice, would be a worthwhile extension to the work undertaken in this research.

This research has identified a lack of clarity over core ICT concepts. Whilst I am aware that colleagues within the IT in Teacher Education (ITTE) community have been working to develop core concepts for the subject. It would be beneficial for this work to be researched further, particularly within the school context.

The continued use of non-specialist ICT teaching staff in schools is worthy of further research, particularly to survey the subject knowledge requirements of this group of teachers. The current emphasis being placed on subject knowledge by OFSTED inspections and the recent (2010) round of Teacher Development Agency (TDA) sponsored events looking at the subject knowledge standards for teachers would suggest that consideration of this issue is timely and necessary. A comprehensive training programme (such as that available to non-specialist mathematics or science teachers) is needed to ensure that all teachers delivering the ICT curriculum in schools are properly equipped with the appropriate knowledge to do so. As Hadjerrouit (2009, p. 172) suggests, '… both teacher education and teaching practice in secondary schools need to emphasise knowledge and qualifications that enable trainee teachers to identify the underlying principles of software…'.

Finally, the potential for ICT to contribute to the development of skills and concepts across the curriculum has been diminished over recent years as ICT has been increasing taught in schools as a discrete subject. It is perhaps time to evaluate this practice once more.

# Appendix 1 – Questionnaire Relating to the Assessment of Pupil ICT Attainment at the End of Key Stage 3

Thank you for agreeing to complete this questionnaire about the assessment of pupil attainment in ICT at Key Stage 3/Year 9. The questionnaire should take no more than 15 minutes to complete. All responses will be treated in the strictest confidence and the collection of names and school details is only for the purposes of identifying potential participants in the follow up interview process. If you do not wish to participate in this questionnaire, please just place the uncompleted document in the envelope provided to return it.

This questionnaire is being sent to the ICT departments of a sample of secondary schools in the Blackpool, Blackburn, Cumbria and Lancashire LEA areas. The data that is collected from this survey will be used in a research study into the assessment of pupil attainment in ICT at the end of Key Stage 3. It is anticipated that the results of the survey will indicate how confident a sample of teachers of KS3 ICT classes are in reaching their judgements of the attainment of their pupils. Following the analysis of the data from this survey we would hope to carry out some interviews with a selected number of teachers who completed this questionnaire, in order to further identify the factors that lead to confident assessment of pupil attainment in ICT at the end of KS3. If you do not wish to be considered for inclusion in the interview process please indicate this in your response to question 16 at the end of the questionnaire.

Once you have completed the questionnaire, please return it in the stamped addressed envelope provided.

Q1.     To what extent is your school using the KS3 ICT Strategy resources published by DfES?
(please tick one response only)

Not at all

Using the Learning Objectives but nothing else

Using the Learning Objectives and some of the materials but not all

Using all the materials as written and straight out of the box

Other (please specify)

_____

Q2.     Please tick the methods used in your school to assess pupils ICT ability at the end of KS3. (please tick all that apply)

Printed output of pupil work

Teacher assessment

Pupil annotation of work

Pupil self-assessment

Peer-group assessment

End of unit or module or KS tests

Other (please specify)

_____

Q3.     Does your school use the exemplar materials published by the QCA as a guide when determining levels of ICT work at KS3? (please tick one response only)

Yes                              No

Q4.     Does your school use the exemplars provided on the NCAction website? (please tick one response only)

Yes                              No

Q5.     Does your school use Pupil Self-assessment to check that pupils have met the criteria for successful achievement of a task? (please tick one response only)

Yes                              No

Q6.     How does your school achieve consistency of assessment in ICT at the end of KS3? (please tick all that apply)

Independent marking of work in the department (i.e. another teacher marks the work of the group)

Departmental moderation of marking

External moderation of marking with other schools

Comparison of current assessment with assessment from previous years

Comparison of current assessment with exemplars provided by QCA and others

114

Other (please specify)

_____

Q7.     Does your school moderate their assessment of ICT at KS3? (please tick one response only)

Yes                              No

Q8.     If yes, how? (please tick all that apply)

Within the school across different groups/sets/teachers

Externally with an informally arranged group of other schools

Externally with a group of schools arranged by the LEA

Other (please specify)

_____

(for questions 9 – 14 please tick one response box only)

Q9.     Consistency of assessment at the end of KS3 is difficult to achieve in our school?

strongly agree        agree              neither agree nor      disagree           strongly disagree
                                         disagree

Q10.    The only accurate means of assessing a pupil at the end of KS3 is by teacher assessment

strongly agree        agree              neither agree nor      disagree           strongly disagree
                                         disagree

Q11.    Pupil annotation of work indicates how a pupil has understood the requirements of a task

strongly agree        agree              neither agree nor      disagree           strongly disagree
                                         disagree

Q12.    Assessment of printed output is central to determining a level of pupils at the end of KS3

strongly agree        agree              neither agree nor      disagree           strongly disagree
                                         disagree

Q13.    The KS3 ICT curriculum provides a good basis for pupils to achieve success in examined courses in ICT at KS4

strongly agree          agree                    neither agree nor        disagree               strongly disagree
                                                 disagree

Q14.    The KS4 examined course(s) in ICT delivered in this school provide good progression from the KS3 ICT curriculum

strongly agree          agree                    neither agree nor        disagree               strongly disagree
                                                 disagree

Q15.    Has your school taken part in the KS3 ICT on-line pilot test? (please tick one response only)

Yes                              No

Q16.    Would you be willing to be interviewed as part of a follow up to this survey? (please tick one response only)

Yes                              No

Q17.    Space for any comments you would like to make.

_____
_____
_____
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_____
_____
_____
_____

Thank you for your time in completing this questionnaire, your contribution is valued. Please return it following the instructions on the first page of the document.

# Appendix 2 – Questionnaire Responses

Q1.     To what extent is your school using the KS3 ICT Strategy resources published by DfES?
(please tick one response only)

4               Not at all

1               Using the Learning Objectives but nothing else

43      Using the Learning Objectives and some of the materials but not all

1               Using all the materials as written and straight out of the box

6               Other (please specify)

Q2.     Please tick the methods used in your school to assess pupils ICT ability at the end of KS3. (please
tick all that apply)

48              Printed output of pupil work

52              Teacher assessment

38              Pupil annotation of work

33              Pupil self-assessment

13              Peer-group assessment

20              End of unit or module or KS tests

9               Other (please specify)

Q3.     Does your school use the exemplar materials published by the QCA as a guide when determining
levels of ICT work at KS3? (please tick one response only)

36      Yes                     19      No

Q4.     Does your school use the exemplars provided on the NCAction website? (please tick one response
only)

15      Yes                     40      No

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Q5.     Does your school use Pupil Self-assessment to check that pupils have met the criteria for successful achievement of a task? (please tick one response only)

36      Yes                     19      No

Q6.     How does your school achieve consistency of assessment in ICT at the end of KS3? (please tick all that apply)

9       Independent marking of work in the department (i.e. another teacher marks the work of the group)

46              Departmental moderation of marking

7               External moderation of marking with other schools

17      Comparison of current assessment with assessment from previous years

17      Comparison of current assessment with exemplars provided by QCA and others

9               Other (please specify)

Q7.     Does your school moderate their assessment of ICT at KS3? (please tick one response only)

46      Yes                             9       No

Q8.     If yes, how? (please tick all that apply)

3               Within the school across different groups/sets/teachers

3               Externally with an informally arranged group of other schools

3               Externally with a group of schools arranged by the LEA

1               Other (please specify)

(for questions 9 – 14 please tick one response box only)

Q9.     Consistency of assessment at the end of KS3 is difficult to achieve in our school?

strongly agree          agree                   neither agree nor       disagree                strongly disagree

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| | | disagree | | |
|---|---|---|---|---|
| 4 | 10 | 14 | 27 | 0 |

Q10.    The only accurate means of assessing a pupil at the end of KS3 is by teacher assessment

| strongly agree | agree | neither agree nor disagree | disagree | strongly disagree |
|---|---|---|---|---|
| 5 | 12 | 16 | 22 | 0 |

Q11.    Pupil annotation of work indicates how a pupil has understood the requirements of a task

| strongly agree | agree | neither agree nor disagree | disagree | strongly disagree |
|---|---|---|---|---|
| 5 | 35 | 11 | 4 | 0 |

Q12.    Assessment of printed output is central to determining a level of pupils at the end of KS3

| strongly agree | agree | neither agree nor disagree | disagree | strongly disagree |
|---|---|---|---|---|
| 4 | 16 | 20 | 14 | 1 |

Q13.    The KS3 ICT curriculum provides a good basis for pupils to achieve success in examined courses in ICT at KS4

| strongly agree | agree | neither agree nor disagree | disagree | strongly disagree |
|---|---|---|---|---|
| 2 | 28 | 13 | 11 | 1 |

Q14.    The KS4 examined course(s) in ICT delivered in this school provide good progression from the KS3 ICT curriculum

| strongly agree | agree | neither agree nor disagree | disagree | strongly disagree |
|---|---|---|---|---|
| 5 | 26 | 13 | 7 | 2 |

Q15.    Has your school taken part in the KS3 ICT on-line pilot test? (please tick one response only)

14    Yes                    40    No

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Q16.    Would you be willing to be interviewed as part of a follow up to this survey? (please tick one response only)

30      Yes                     25      No

# Appendix 3 – Interview Schedule

Introductory Script:

Welcome and thank you for being willing to participate in this interview today. As you will be aware, this interview is a follow-up to the questionnaire survey you completed a while ago.

Can I first of all assure you that your identity will remain completely anonymous in this research and no records of the interview with your name on them will be kept. Although the whole interview will be recorded on minidisk, your identity will not be disclosed on that disk, nor will the disk be labelled with your name or details. Also, in the subsequent analysis of the data gathered in this research project, you will not be identifiable from any of your responses to either the questionnaire or the interview. Are you happy with these arrangements?

You may remember that the questionnaire survey related to the assessment of pupils attainment in ICT at the end of Key Stage 3. Based on the responses to the questionnaire, I've invited a number of teachers to a follow-up interview such as this, and what I'm looking to explore with you today is how you arrive at an assessment of performance for a pupil in ICT at the end of KS3, how confident you are in that assessment and how you achieve consistency in assessment both within the year and also from year to year. Once the whole interview process has been completed, I will analyse the data that has been gathered and the results will be published along with any conclusions that can be arrived at. Do you have any further questions relating to the research project?

Are there any other initial questions before we start?

Interview:

| Main Question | Clarification and follow up questions |
| --- | --- |
| When you are identifying NC levels at the end of KS3, how do you decide what level a pupil has achieved? | Use examples to clarify, e.g. set tasks, tests, pieces of work etc.<br>Take each method in turn and explore specifically how it is used.<br>Encourage use of particular pupils as example (anonymously) if required. |
| How confident are you that the NC levels you award are correct?<br>Can you explain why you feel this way? | Relate back to the questions on the questionnaire dealing with this issue<br>Be careful not to be threatening – ensure that the respondent understands that you are looking to identify factors that would increase confidence, not undermine the assessments that have been made. |
| What do you think are the main differences between | Again, try and get the interviewee to identify specific |

| | |
|---|---|
| a pupil who is achieving level 4 and one who is achieving level 5 in ICT? | things. Ask them to explain 'gut reaction' when used in levelling.<br>If necessary use NC statements such as independence of use of ICT to help. |
| What recording mechanisms do you use to identify pupil attainment on a day-to-day basis? | Ask interviewee to specify, but be careful not to be threatening or judgemental.<br>Relate back to previous questions if possible. |
| How do you achieve consistency of assessment between classes in the same year band and then across the years? | Deal with each point separately.<br>Again, beware of being a threat.<br>Look for any innovative methods that might be being used – how did they devise the methods they use? |
| Has your experience of assessment of ICT at KS3 over the last 'n' years led you to a greater level of confidence, consistency and accuracy in these assessments? | Obviously only applicable to those interviewees with several years of experience. Look to relate back to first question – has the interviewee's levelling changed? If so, how and what has caused these changes? |

Conclusion:

Ask if the interviewee has any final questions.
Thank the interviewee.

# Appendix 4 – Extract from Code Book

| Code text | Interview Occurrence | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Ability range within level | √ | √ | √ | √ | √ | | √ | √ | |
| Adapted strategy | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Additional assessment | √ | √ | √ | √ | √ | √ | | | |
| Administration load | √ | | √ | | | √ | | √ | √ |
| Annotation of work | √ | √ | √ | √ | | √ | √ | √ | √ |
| Assessment for learning | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Best fit | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Capability | √ | | | √ | √ | | | | |
| Confidence in levelling | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Consistency of levelling | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Contact with other schools | √ | | √ | √ | √ | √ | √ | | √ |
| Cross marking | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Cross moderating | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Dealing with absence | | √ | √ | √ | √ | | √ | | |
| Difference between L4&L5 | √ | √ | √ | √ | | √ | | √ | √ |
| Experience as HOD | √ | √ | √ | √ | √ | | √ | √ | √ |
| Experience of department | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Experience of young teachers | √ | | √ | | | √ | √ | | |
| Have piloted test | √ | √ | | √ | | | √ | | |
| ICT at home | √ | √ | | √ | | | √ | √ | |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ICT Capability | √ | | | | | √ | | | |
| Impact of test on curriculum | | | | √ | | | √ | | |
| Importance of ICT | √ | √ | | | √ | √ | | | √ |
| Independence of pupil action | | | | | | | | √ | √ |
| Inspection evidence | | √ | √ | | √ | | | | |
| KS4 ICT | √ | √ | | √ | | √ | √ | √ | √ |
| LA moderating | √ | | √ | | √ | √ | √ | | |
| LA Training | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Lower ability children | √ | √ | √ | | √ | | √ | √ | √ |
| Mapping NC to work | | √ | √ | | √ | √ | | √ | √ |
| Nervous about sharing work | | √ | | √ | √ | | √ | √ | √ |
| Non specialist staff | √ | | √ | √ | √ | | | √ | √ |
| Non strategy material | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Not using strategy material | | √ | | √ | √ | | | | |
| Other Tests | √ | √ | | √ | √ | √ | | √ | |
| On-line Test | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Output driven assessment | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Skills teaching | √ | √ | √ | √ | √ | √ | √ | √ | |
| Strategy negative | | | √ | √ | | √ | | | √ |
| Strategy positive | √ | √ | | | √ | | √ | √ | |
| Student self assessment | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Student tick box | √ | √ | √ | | √ | √ | √ | | |
| Teacher assessment vital | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Teacher assessment | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Teacher tick box | √ | √ | √ | √ | √ | | √ | √ | √ |
| Teaching to test | | √ | √ | | | | √ | √ | |
| Test effect on KS4 | √ | √ | | √ | √ | | √ | √ | |
| Test language level | √ | √ | √ | | | √ | | | √ |
| Tracking other | √ | √ | | √ | | √ | | √ | √ |
| Tracking spreadsheet | √ | √ | √ | | √ | | √ | | √ |
| Use of email | | √ | √ | √ | | | √ | | |

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