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University of Southampton

**Teachers' perceptions of using ICT (Information and
Communications Technology) in the Further Education classroom**

**by
Antony Card**

**A dissertation submitted in partial fulfillment for the degree of
Doctorate in Education (EdD)**

August 2003

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Dedication

To my mother and father, Dinny and Ian

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF SOCIAL SCIENCES

RESEARCH AND GRADUATE SCHOOL OF EDUCATION

Doctorate in Education (EdD)

Teachers' perceptions of using ICT (Information and Communications Technology) in the Further Education classroom

by Antony Card

Considerable sums of money have been invested through government initiatives and by Further Education colleges themselves with the aim of encouraging teachers to use ICT (Information and Communications Technology) in the classroom. This investment in Information Technology is not entirely supported by empirical research data and there appears to be a lack of critical thinking as to how Information Technology can enhance pedagogical practice. Further, the concerns of teachers in Further Education about implementing ICT have not been voiced in the literature.

This study investigated the teachers' perceptions in using ICT (Information and Communications Technology) in the classroom. The focus of this study was a large Further Education College on the South Coast of England.

This dissertation employed a dualist, or mixed-paradigm, approach, although greater emphasis was given towards the qualitative rather than the quantitative methods. The dualist approach facilitated the triangulation of the data. A questionnaire was distributed to a stratified sample and this was followed by semi-structured interviews that aimed to capture the perceptions and lived-experiences of teachers in using ICT in the classroom. The questionnaire was presented online, although a low response rate meant that this approach was abandoned in favour of a paper-based version. The quantitative data was analysis using SPSS version 11 and the qualitative data transcribed and analyzed using QSR NUD*IST version 4.

The investigation found that the majority of teachers expressed confidence in using computers, but were not confident enough to use them in the classroom. Feelings of vulnerability and poor understanding as to how the technology can be used in the classroom account for some of this lack in confidence. A lack of time to develop ICT resources, and difficulties with accessing equipment were significant barriers to using ICT in the classroom. The centralizing of resources, attitudes of managers and training needs were other barriers to implementation.

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CHAPTER ONE

Introduction

This chapter outlines the background to this study of Further Education teachers' perceptions in using ICT (Information and Communications Technology) in the classroom. The setting for this study was a Further Education College on the South Coast of England. The current situation of ICT in Further Education Colleges is discussed and a working definition of ICT provided. Finally, the chapter concludes with an overview of the study.

Background to the research

The foundations for this research began in June 2000. I had attempted to deliver some of my own lectures using Microsoft PowerPoint and, consequently had to deal with a number of issues such as how to use the technology in the most effective way, how to gain access to resources required and how to improve my own skill level. It transpired that these were also pertinent issues for my colleagues, friends in other colleges of Further Education and in the wider education press. I therefore enrolled on the professional development for teachers course 'ICT for Teachers' in September 2000 and began to work on the research strategy and design. I worked hard in developing my own IT skills and became proficient with the main suite of Microsoft programs including FrontPage (for web-page design) and PowerPoint (for making presentations). As news of my research and interest in ICT spread throughout my institution I was invited to make presentations of my research proposal and to update staff on the latest research and ideas. The invitations extended to joining a number of committees that ultimately incorporated all of those concerned with ICT and the college.

My newly acquired expertise was acknowledged by being asked to teach IT as a subject to 16-19 year olds and being appointed as an 'ILT Champion'. Essentially an ILT Champion promotes the use of ILT in classroom, explains how ILT can be used

to enhance the learning process and assists other members of staff with the technical aspects of using learning technologies. In order to become an ILT Champion, I attended a specific training course as well as other exhibitions and conferences organized by BECTA, (The British Educational Communications and Technology Agency) and NILTA (National Information and Learning Technologies Association). These organizations have had, and continue to play, an important role in determining how ILT is to be funded, promoted and developed in Further Education Colleges. A brief outline of how these organizations have determined the development of ILT in colleges is discussed, and a more detailed description of each organization can be found in appendix iii.

It was my passion for ICT and my desire to understand the difficulties and challenges that teachers face in implementing ICT that influenced my decision to undertake this study. Further, it was my work as an ILT Champion which meant that I had an understanding of the types of technologies that teachers would be most likely to use. It also gave me an insight into the issues that were worthy of further investigation.

The ILT initiative in Further Education

The Further Education Funding Council's (now the Learning and Skills Council, LSC) strategy for the development of a physical infrastructure and a range of support activities to facilitate the effective use of information and learning technology (ILT) is reflected in Circulars 99/18, 99/45 and 99/53. In addition to the provision of wide area network connections and of resources to enable colleges to strengthen their local area networks, the LSC, through its Further Education Information and Learning Technology (FEILT) Committee, had defined a number of significant research, support and development activities to underpin the initiative.

Becta was appointed as the LSC's managing agency for many of these activities, but the NLN initiative will be delivered through Becta's strategic partnerships with a range of sector bodies, and in particular LSDA (Learning and Skills Development Agency), JISC (Joint Information Services Committee), NILTA (National Information and Learning Technologies Association), and UKERNA (United Kingdom Education and Research Networking Association).

Part of the NLN (National Learning Network) strategy includes funding for an intensive training programme to start the process of preparing two to three individuals to take on the role of 'ILT Champion' in their colleges. The ILT Champion's role is primarily to raise the awareness of the actual and potential use of ILT to support administrative and curriculum practice. Training programmes were piloted from the summer 2000 with the aim of providing Champions with an introduction to the range of knowledge, skills and abilities that an ILT Champion in college requires. To have an impact on curriculum delivery via ILT, Champions were furnished with materials that they can use with colleagues and management in a work setting and they were introduced to models of ILT planning, implementation and evaluation in order that they can effectively embed ILT into their own practice and that of their college. It was anticipated that ILT Champions would also discuss and share practice with colleagues who are, or will be, performing the ILT Champion role.

Defining IT, ICT and ILT

ILT refers to the application of IT (information technology) and/or ICT (information and communications technology) to the core business of further education. The term arose from the work of the Sir Gordon Higginson Committee that was tasked by the Further Education Funding Council (now the Learning and Skills Council) to examine the use of IT in colleges. The committee concluded that it was important to define a distinctive term to refer to the specific set of uses to which colleges apply computer-based information technology. Information and learning technology (ILT) was coined to 'put the Learning in IT'.

The notion of ICT incorporates the networking together of computers. This allows computers to do stand-alone type tasks more effectively, insofar as it potentially makes available a wider range of shared software held centrally on servers and can make management of the systems easier and more efficient. The key to ICT, however, is in the possibilities for communication, both within and between institutions.

IT, therefore, refers to the hardware, software and skills that surround a single stand-alone computer or laptop. With regard to hardware, IT refers to the basic box and add-ons such as printers, scanners, CD-ROM, DVD drive and so forth. Software

associated with this definition includes productivity software, such as word processors, spreadsheets, databases, and graphics and presentation packages. These are familiar to most users of the Microsoft products such as Word, Excel, Access and PowerPoint.

In addition there are subject specific packages for CAD (computer-assisted design), accountancy and a range of commercial applications. Developing skills in the personal use of IT typically consists of acquiring proficiency in basic Windows operations and increasing degrees of expertise in the use of one or more packages. Training programmes, such as RSA (Royal Society of Arts), CLAIT (Computer Literacy and Information Technology) qualification, focus on taking users through a low-level set of fundamental operations in three packages (most typically a word processor, a spreadsheets application and one other) as a basis for subsequent development. As an initial engagement with computers and their applications, such programmes are often highly motivating and personally rewarding.

Within a college, the most obvious immediate impact is likely to come from e-mail between staff and access to college databases, notably student and course information, together with full MIS (management information system) data. Externally, there are possibilities for links with other colleges, validating and funding agencies and with the vast information and communication resources on the World Wide Web.

(BECTA, 2001, p.5)

The software added into the mix by the move from IT to ICT includes communications software such as Microsoft Outlook, browser software such as Internet Explorer and Netscape, and web authoring packages such as Dreamweaver. The capability to produce and maintain a college web site, or its internal equivalent, an intranet, opens new opportunities for communications. The people skills involved can be classified as user/receiver (browsing, reading e-mail) or creator/sender (Web authoring, sending e-mail).

The current situation of ILT in Further Education

Considerable sums of money have supported the development of Information and Communications Technologies in Further Education. The National Learning Network

(NLN) was launched in November 2001 after the government allocated £74 million to colleges for the development of ILT. The Learning and Skills Development Agency Briefing (September, 2001) reported an announcement by Estelle Morris, the Secretary of State for Education and Skills, that an extra £84 million in funding, spread over two years, to help FE colleges to develop their IT systems. The intention is to spend money in improving the infrastructure and hardware and to increase the uptake in information and learning technology (ILT). In this announcement Estelle Morris made the point that IT provision in the past has been too varied for too many learners and best use has not been made of existing resources. These significant sums of money do not include the investments that colleges have made themselves from internal budgets towards ILT. This investment in ICT in Further Education has not been supported by research data and there has been very little, if any, critical thinking as to how the technology can enhance pedagogical practice (Davitt, 2001, p.64). Little is known about the expectations and fears of Further Education teachers as they are confronted by more and more ICT, and by the growing pressure to integrate ICT into their classroom practices.

This research project aimed to understand teacher's perceptions in the introduction of ILT in the classrooms of a Further Education college. However, authors commonly use IT, ICT, and other terminology when they mean ILT. A glossary of terms can be found in the appendices. The term ILT has been adopted by the Further Education sector, when schools, universities and the broader educational journals use the term ICT. ICT has been used in the title of this thesis so that it can appeal to a wider audience, but it is acknowledged that ILT is the abbreviation used in Further Education.

Three key research questions were addressed in this research. First, the question was asked, how do teachers use ICT in the classroom? Secondly, what is their understanding of the potential for ICT in the classroom? Thirdly, which management strategies create a meaningful structure for implementing ICT in the classroom? A table of research questions and sub-questions is included with chapter three, Methodology.

An Overview of the study

Chapter one gives a background to the study. The current situation of ICT in Further Education Colleges is discussed and working definitions of IT, ILT and ICT are provided.

Chapter two critically reviews the literature on teachers' perceptions of ICT in the classroom. The review considers the place of ICT in the classroom, the potential for ICT in the classroom and managing the development of ILT in a Further Education College. This chapter concludes by discussing the need for research in this area.

Chapter three outlines the mixed paradigm approach that was developed for this study. The research design gave primacy to a qualitative approach, through semi-structured interviews, rather than the quantitative aspects of the questionnaire. The mixed methods approach facilitated the triangulation of the data. The problems associated with evaluating teachers' perceptions in using ICT in the classroom, the notions of neutrality, empathy and insight and ethical considerations are also discussed.

Chapter four provides a discussion and analysis of the findings. The pedagogical changes required in a move towards constructivist model of learning are considered. The discussion then examines the potential for ICT and, in particular for the use of PowerPoint, CD-ROMs, the Internet and other types of technology. The chapter then focuses on teachers' and managers' perceptions of using ITC in the classroom with attention given to the issues of staff development, barriers to using ICT in the classroom, confidence and skill requirements for the use of ICT, and job satisfaction.

Chapter five, the conclusion, highlights the limitations of this research, examines emerging trends, looks at the implications for future research and makes recommendations for the integration of ICT into classroom practices.

CHAPTER TWO

Review of Literature

“There’s been a quiet revolution, and what’s more it has been a structured one, with a Government plan behind it. Tens of thousands of teachers in thousands of schools have begun to change the way they teach. Even kids are getting enthusiastic about lessons.” (Fletcher, 2001, p.18)

This quotation from Fletcher (2001) captures, in essence, the sense of a government-backed revolution in the use of educational technology. The British Government has followed the global trend by investing billions of pounds to put computers into schools and colleges. This literature review makes the case that recent technological advances have created the possibility of new ways of teaching and learning. However, taking full advantage of this potential requires teachers to think about the teaching and learning process in new ways, and they need to master the technology itself.

This literature review also makes the point that the investment in Information Technology is not entirely supported by empirical research data and that there is a lack of critical thinking in how Information Technology can enhance pedagogical practice. The argument gives rise to the concept that the successful integration of Information Technology in education is about challenging existing pedagogical practice rather than just adopting technical solutions. Teachers are now required to embrace a new cultural paradigm; to transform their traditional classroom delivery methods into an enabling, collaborative culture that supports innovation. This chapter draws on the literature which has predominately focused on the mainstream schools sector. This research, therefore, sought to examine whether the situation in mainstream schools was also applicable to a Further Education College.

The Place of ICT in the classroom

The Technology Imperative and the use of ICT in the Classroom

Davitt (2001, p.64) points out that it is now common for schools and colleges to spend up to £1 million on Information Communications Technology (ICT) provision and to

talk only to computer sales people. Teachers and learners are often excluded from the debate, and the result is that more computers are shoehorned into schools without concern for their purposeful use or good design.

As more rooms get thoughtlessly filled with large boxes and screens, multipurpose learning opportunities are banished in favour of individual screen gazing. It is time to put the learning environment first and sculpt the use of ICT to meet our overall needs. (Davitt, 2001, p.64)

Hulume (1993, p.13) concurs with Davitt (2000) in making it clear that the only way to achieve the benefits associated with the use of ICT in the classroom is to fully incorporate ICT into the learning culture and to make ICT an integral part of course design. The narrow view of computers in classrooms for instruction in computer literacy needs to be replaced with the broader view of computers as tools to enhance learning across the curriculum. De Matos (1995, p.4) questions the future role of the computer studies syllabus and, indeed the role of the computer studies teacher in the school of the future. De Matos (1995) views the computer studies teacher as having a key role in developing teachers' ability to use IT in all areas of the curriculum and having a smaller role in teaching just the technical aspects of computers in the future.

Kozma and Johnston (1991) conceptualised seven ways in which instructional technology can support learning:

- Enabling active engagement in construction of knowledge
- Making available real-world situations
- Providing representations in multiple modalities (e.g. 3-D, auditory, graphic, text)
- Drilling students on basic concepts to reach mastery and facilitating collaborative activity among students
- Seeing interconnections among concepts through hypertext
- Learning to use the tools of scholarship
- Simulating laboratory work.

These seven uses of instructional technology have been widely accepted and used across North America and adopted by the Centre for Communications and Information Technology (CCIT) at Duquesne University. (Frayer and West, 2000)

Marsh and Wright (2000, p.3) state that over the past three decades research articles have consistently tried to find the differences between computer assisted teaching and regular class teaching. The differences were expressed in quantitative terms derived from test scores or other traditional measurements. In these studies, the use of computers produces higher test scores than with regular class instruction. However, as Marsh and Wright (2000, p.5) go on to argue, it is no longer possible to consider using quantitative measures such as test scores or the frequency of computer use, given the way that computers are distributed and the range of applications, types of computers and software available.

Gilbert and Green (1997, p.38) noted that with technology moving at a fast pace it is difficult to evaluate its productivity effectively. This is often referred to as Moore's Law, after Gordon Moore, former Intel CEO, who stated that computer technology doubles in its performance at any given price level every 12 to 18 months. Longitudinal studies, therefore, become impossible because the context of the research can change significantly in a short period of time.

ICT and Constructivist theories of learning

Computers, according to Hannafin and Freeman (1995, p.50), are suited to a student-centered, or constructivist approach to learning. The constructivist approach highlights the importance of promoting learners' activity from the start. Learning, therefore, is about active involvement on the part of the learner with a series of progressive, meaningful activities for realizing learning goals (Huang, 2002, p.28). Some teachers tend to view knowledge and its acquisition on a continuum from logical positivism (objectivism) to constructivism (Hannafin and Freeman, 1995, p.50). Teaching methods that involve the formal, didactic, transmission of knowledge by the teacher are consistent with objectivist learning. Constructivism, at the other end of the continuum, is the process by which the learner takes responsibility for their own learning and the active construction of meaning from the learning process. The teacher cannot entirely foresee what the student will find. (Witfelt, 2000, p.239)

In a constructivist learning environment, all teaching and learning strategies are from a teacher's perspective a question of facilitating. Facilitating is really the most central aspect in constructivist multi-mediated teaching; it is the ability to make students think for themselves, perform project oriented work, search for information, use everyday experience in projects and so forth.

(Witfelt, 2000, p.238)

According to Hannafin and Freeman (1995, p.50) a teacher's predisposition towards objectivism or constructivism is likely to dictate the way the in which they allow their learners to interact with the computer. For instance, at the objectivist end of the continuum, the teacher may require the learner to undertake a basic recall task, as opposed to a non-directed search of the Internet from the constructivist perspective. Hannafin and Freeman (1995, p.50) used a questionnaire with thirty-six teachers and thirty-one pre-service teacher candidates to determine whether they held objectivist or constructivist viewpoints. Hannafin and Freeman (1995, p.55) concluded that the objectivist viewpoint predominated. Moij and Smeets (2001, p.404) note that these teachers are likely to use skills based software as opposed to the open-ended software that is more likely to be used by teachers who support constructivist viewpoints.

The methods of constructivism emphasize development of the learners' ability in solving their real life problems. As a result, problem solving and free discovery come together (Huang, 2002, p.29). In order to constitute constructivism, the learning process must be active, cumulative, integrative, reflective, goal-directed and intentional (Jonassen, 1996, p.11). 'Active' refers to the students being engaged in processing information in a meaningful way. 'Cumulative' means building on prior learning that, by 'integrative' is linked to existing knowledge. 'Goal-directed' and 'intentional' infer that constructivism is a goal-oriented process and that the learner is continuously 'reflective' of their own progress.

Constructivism, argues Matthews (2002, p.122), is much more than a theory of learning; it is a theory of teaching, a theory of cognition and an epistemological world-view. Indeed, Marsh and Wright (2000, p.5) argue that the prevailing

philosophy in education as a whole is now constructivist although evaluation procedures remain based on behavioural outcomes.

Dillon (1998, p.33), in a review of telematics (information and computer technologies) in teaching and learning in Higher Education in the United Kingdom, suggests that telematics is influenced by both the behaviourist and constructivist theories of learning. The behaviourist position is characterized by an objective view of knowledge, by a serial structuring of material and program control and by regular review and testing against pre-specified criteria. The constructivist position, on the other hand, is characterized by a provisional view of knowledge, by flexible approaches to interaction with equipment and by attention to the social context of learning.

The requirements to be a teacher in the more open and creative education system are different from those implicitly defined by the conventional system. (Osin, cited in Baruch et al., 1996, p.177) Dillon (1998, p.34) goes on to make the point that current design trends in telematics incorporate both behaviourist and constructivist perspectives. Typically, with a constructivist approach, the learning material takes account of the learner's previous experience and knowledge. It incorporates demonstrations and simulations and it makes the language familiar to the individual with natural grammar and feedback.

ICT, therefore, has the potential to transform a classroom from one that is founded on behaviourist or objectivist principles to a classroom based on the prevailing constructivist philosophy. The suggestion here is that in order to identify a transition towards the constructivist philosophy, consideration needs to be given as to the way in which Further Education teachers use technology in the classroom. Acknowledging the characteristics of constructivism is important to this research design. The way in which ICT is used may, therefore, also indicate a deeper philosophical change in approach to the teaching and learning situation.

The purpose of this project was not to determine the nature of the learning process using ICT, but to see if teachers' have a perception of the change in their roles

following the introduction of ICT into the classroom. In this study, I make the assumption that the teachers may not have heard of, or be able to identify, the constructivist perspective per se, but that they may acknowledge some of the characteristics of constructivism or even just note differences in their teaching approach.

The potential of ICT in the classroom

The Benefits of ICT in the classroom

The benefits of a technology-rich classroom have been identified by Hulume (1999, p.13) as promoting more project-oriented, collaborative, problem solving opportunities. ICT in the classroom can create an increase in student autonomy and engagement. Technology is claimed to promise a more pleasurable learning experience and, therefore, to enhance intrinsic motivation. The Internet can bring the outside world into the classroom, and with a program such as PowerPoint a colourful, intense audio-visual experience can be created. Another claim is that technology can accommodate different learning styles and learning speeds.

The key reasons for using ICT in the classroom have been identified by Ayerst (2000, p.2) as including:

- Speed and automatic functions of ICT can enable teachers to demonstrate, explain or explore certain aspects of teaching.
- The capability and range of ICT can enable teachers and pupils to gain access to historical, recent or immediate information, through, for example, accessing information on CD-Rom or on the Internet.
- Work presented through ICT can easily be changed or modified using a word-processor to edit and refine writing
- Explore prepared and constructed models and simulations
- Communicate with others locally and over distances easily and effectively
- Search for and compare information from different sources
- Present information in ways that are accessible in different forms for different audiences.

Effective use of ICT might include:

- Delivering specific teaching points on grammar or modelling
- Sharing the writing process using a word processor package
- Providing access to sources of information from a CD-ROM or the Internet, for example using images of a distant locality to discuss similarities and differences

- Collating and reviewing information which the class has been allocated through a survey
- Demonstrating how to use a new piece of software or teaching new techniques such as how to enter searches into web search engines
- Using talking books or electronic texts

(Ayerst, 2000, p.2)

ICT can break the professional isolation that many teachers suffer. With ICT, teachers can easily connect with other teachers in the same or other colleges, and with sources of teaching materials and professional assistance that are readily available online. Opportunities are also available online for professional development through distance learning courses, journals and bulletin boards. (Haddan, 2000)

It is beyond the scope of this study to examine gender differences in learning through ICT. However, it is acknowledged that there may be little difference in the performance of boys and girls in using ICT. Such differences may be more apparent elsewhere in the curriculum. Volman and van Eck (2001, p.613) have provided a detailed overview of research into gender differences carried out in both Holland and Scotland. Volman and van Eck (2001, p.613) note that any difference in learning capacity between boys and girls is mainly due to the availability of a computer at home. Another significant factor is the 'hidden messages' that teachers give out about the capacity of boys and girls to work with ICT. A plethora of ICT solutions are also commercially available for students with learning difficulties, visual or auditory impairments and other handicaps.

Avoiding the Hype

Considerable hypes and heresies concerning the expectations of ICT have surfaced in recent years. Claims of a revolution in education have emerged, but as Dillemans et al., (1998, p.225) assert, experts believe that ICT has the potential to facilitate the shift from a teaching model to a learning model of education. The educational reform through ICT is, however, not thought of as being revolutionary or high-speed. Intentions to con by false publicity (hype) or simple opinions opposed to research

based knowledge (heresy) have abounded as technological improvements and cost pressures have challenged the status quo in education. Selwyn (1999, p.5) and Freeman and Capper (1999, p.3) have provided journal articles that attempt to distinguish between hypes and heresies on the one hand and empirical research data on the other. Freeman and Capper (1999, p.3) have identified the following statements that run counter to current educational research:

- Face to face (FTF) learning will go. The only university in the future will be the virtual one.
- Microsoft University or McDonalds University-these will be the only Universities of the future.
- Sophisticated programs integrated into the Internet will surely replace teachers.
- IT improvements mean that people will learn more and more quickly.
- Everyone will prefer to learn in his or her own time and place using the Internet.
- There is a wealth of evidence to suggest that IT solutions have significantly improved learning.
- There is no substitute for FTF instruction (and this includes IT).
- We need a short course to get our academics up to the speed of our students in PowerPoint and Netscape.
- Successful teachers, having found the right formula should stick to it.
- Teachers are relatively unimportant because it is students who do the learning.
- IT will enable economies of scale in teaching resulting in large cost savings. The Internet in particular is the most efficient method of teaching available today.
- Substantial cost savings are just around the corner once we overcome this initial hump from investing in the right size “pipes and pumps”.
- Students want to learn flexibly. Transferring as much data as possible onto the web is the best way of achieving a flexible learning strategy. Students can then download the lectures in text or video in their own time and place.
- IT is particularly advantageous for extending gifted students as they have control over what information they can consume and a huge range of resources from which to choose.
- Males are more likely to make better use of IT teaching methods.
- Academics should respond to the evidence that teaching matters and develop their IT skills for teaching. The best solution is to learn some authoring language like Authorware or HTML.

Freeman and Capper (1999, p.3)

In his book “The No Significant Difference Phenomenon” Russell (1999) examines 355 research reports to conclude that there is no significant difference in educational attainment between face-to-face and distance education.

A critique of Russell's (1999) original list is provided by Neal (1998, p.1) who claims that there are many shortcomings; the research designs are poorly conceived, the statistical analysis is weak or absent, and the sample size is often too small. Many of the studies do not try to measure learning outcomes such as how the student felt about their experience rather than what they learned. The studies that do try to assess student learning as an outcome variable often use tests that measure simple recall of information rather than mastery of higher order learning. In these cases, argues Neal (1998, p.1), "it is surprising that there is no significant difference in performance because it really does not matter how students acquire factual information."

Cravin (1999, p.7) has determined that there are four essential roles that learning via the World-Wide Web takes on in relation to education. These roles include the following: The Web as Tutor, The Web as Publishing House, The Web as a Forum, and the Web as Navigator.

The most basic element of using the Web as a pedagogical instrument is found in its ability to present information clearly, attractively and effectively. Thus, the web is a tutor in that it can be used to design tutorials and online lessons for a variety of subjects. The World-Wide Web gives students the opportunity to create their own complex learning environments and present information in a variety of visual forms for their peers or for assessment purposes. Traditionally, students have been restricted to conventional forms such as essays and reports, whereas the Web can now be seen as a publishing house. The Web can act as a forum for discussion; bulletin boards, chat rooms and e-mail mean that the Web can form the basis for virtual debate and discovery. The Web can also act as a Navigator or information catalogue. Search engines, such as the database know as 'Yahoo', each have a substantial sector on educational resources. In fact, it can be argued that Yahoo, and other search engines, are so extensive that they can be cumbersome and overloading.

An important distinction needs to be drawn between deliberate intellectual engagement in developing cognitive affirmations in the learning process and the non-

purposeful clicking of links on a web page. The latter is commonly referred to as 'edutainment'.

Aside from edutainment, there is a growing belief amongst academics that computer-mediated communication (CMC) encourages free-flowing exchanges of ideas.

It is often claimed that CMC has substantial educational potential, both in distance learning, where opportunities for discussion are restricted, and in traditional Higher Education (HE), where student discussion about issues between themselves and with tutors is often sporadic.

(Barbieri and Tolmie, 1997, p.207)

Adams and Brindley (1998, p.179) reported on a research programme conducted by university lecturers in the United Kingdom, Australia and Canada, where information technology (IT) was used to create a collaborative writing environment for English teachers to use in their classrooms. They concluded that there are vast opportunities in the sharing of pedagogical practice and with the personal and social development associated with engaging in dialogue with people of other cultures.

McMahon et al. (1999) have identified barriers to student computer usage from the perceptions of both staff and students. Every grouping of people develops its own culture in the way that it sanctions particular types of behaviour, has norms, explicit and implicit rules and demands conformity. On-line communities, Mills and Trait (1996, p.92) argue, are no exception. Appropriate technical support is essential in learning 'netiquette' and allowing students the chance to become comfortable with the technology.

Implementation of a new medium or method cannot be expected to work perfectly, but probably provides some benefits along with its disadvantages. We need to learn the lessons of each implementation, and then use those lessons learned. In this way we slowly build a body of knowledge of how best to use the educational media, and a teaching profession that knows what it is doing and why. (Laurillard, 1993, p.8)

This statement by Laurillard (1993) is, significant in informing this study. There is recognition that implementing ICT may have advantages and disadvantages and that its implementation may not necessarily be a smooth process. The need to gradually build a body of knowledge is, in my opinion, a necessary step as Further Education teachers are being increasingly expected to integrate ICT into their pedagogical practice.

In the preface to *An Educator's Guide to Evaluating the Use of Technology in Schools and Classrooms*, Quinones and Kirshstein (1998) state that:

As more and more states, districts and schools develop plans to ensure that technology will be used effectively to benefit students learning and achievement, the need to understand technology's impact on improving student achievement will become even greater. Furthermore, the finding that states and districts receive money to implement components of technology plans often requires some type of evaluation. The question thus becomes, how do you evaluate educational technology programs that vary in: the type of students they serve, the curriculum areas in which the teachers use technology, and the type of technology itself?

Research in educational technology is problematic; not only is the pace of technology changing so quickly, but the range of tools available is complex and can take considerable time to learn. The challenge for this study was to develop a research design that could take into consideration differences in courses, student demographics and technologies used across the Further Education College. A carefully constructed questionnaire and a semi-structured interview schedule offered a way of capturing the breadth and depth of the scope of the study. Further consideration also needed to be given to the use of technical terminology that is required to understand the potential for ICT and can also be confusing to teachers. The appendix includes a glossary of technical terms used in this study.

Managing the Development of ILT in a Further Education College

Issues of Implementation

Information technology should not be considered to be a panacea for all teaching and learning. The implications of technology in education were the focus of a conference

titled 'Should educators be worried about technology' held in Toronto in April 2000. Unlike Hulume (1993, p.13), Chambers (2000, p.4) reports that there was a strong consensus from the speakers in the belief that technology could enhance and enrich the work that teachers do to prepare students to engage productively in a democratic society. However, the case was put that learning how to get along with each other is not necessarily achieved through technology. Computers demand solitary work, where often what is needed is teachers who represent that human face of learning.

Teacher trainers and those responsible for the development of existing teachers have expressed concern that teachers are not familiar with Information Learning Technologies and how to apply them in the classroom setting. Simpson et al. (1998, p.431) express the student teachers' expectations that information and communications technology (ICT) will permeate their professional lives both now and in the future.

The case for the redesign of the current teacher-training model is given voice by Cadenas et al. (1999) who see it as necessary for education to lead the charge into the 21st century. In terms of training in ICT these authors state that teachers today receive a training that is similar to that received by teachers fifty years ago. Cadenas et al. (1999) argue that, generally, teaching methodology courses focus primarily on serving the needs of the traditional student. Teachers learn to utilize resources that are often obsolete and rarely effective. Novice teachers enter the educational arena with few tools and little armour, decreasing their chances of survival. Education, therefore, must infuse teacher training with the enabling factors of technology that will adequately prepare teachers for the future.

The University College of Education in Iceland began a BEd degree by correspondence in 1994. Students taking these distance learning courses now use a range of telelearning media including e-mail, Gengir (which is a co-ordinated library catalogue for Iceland), on-line conferencing available through the Icelandic Educational Network and other databanks available through the World Wide Web. Jeppesen (1997) argues that,

The spreading of electronic database technology and its application to various communication technologies has created hitherto unknown opportunities, not at least in the field of distance learning. Teaching methods have undergone changes in this milieu. (Jeppesen, 1997, p.57)

Laurillard (1993) argues that research and development projects on educational media pay quantities of hard cash for development; give lip service to evaluation; and pay no attention to implementation. "There is never enough cash to equip a decent programme of piloting, dissemination, and staff training that would be needed to properly establish an innovation." Laurillard (1993, p.8)

This view is supported by Davis (1999, p.3) who contends that communications technology in education provides many new opportunities, but that it takes care and courage to work these innovations into effective teaching and learning. Telelearning is in effect creating two types of pedagogies; those which can only occur because of telelearning and those which are set to enhance traditional approaches to teaching and learning as a form of 'pedagogical enrichment'.

Collis (1996) describes the work of educational technologists in finding the best match of technological media to the learning process as 'pedagogical re-engineering'.

Those who design, deliver and guide telelearning experiences and resources are being enormously challenged to re-consider and re-engineer their own instruction practices. Collis (1996, p.14)

A solution for Akpinar and Hartley (1996) is provided by software which is not only interactive, but where it can also adapt to different styles of learning and teaching. The quality of support documentation and technical support, the ease in using the software chosen and the integration of technology across the organization are viewed by Geyar and Cuskelley (1994, p.168) as key factors in the success of computer mediated communication (CMC) postgraduate courses.

Dimaraki et al. (1998, p.181) make the case that the transition from a textbook based education system to a web-supported community is far from straight forward. The problem is no longer access to information, but selection of information. Dimaraki et

al. (1998, p.181) propose that a solution to the problem would be to insulate students from the vastness and complexity of the available resources by using the web to deliver self-contained 'lessons' similar to traditional textbooks. This has another advantage in restricting the student from following non-productive hyperlinks. Placing such constraints, however, could restrict the pedagogical potential of the new medium.

An evaluation by Mason (2000, p.2) of a computer literacy program offered to members of the faculty of education at the University of Melbourne found that although specific skills courses, such as Word for Windows and PowerPoint are useful and indispensable in assisting teachers to become more computer literate, they do not usually address common anxieties associated with becoming conversant with new technologies. Teachers, therefore, need more than just IT skills when making effective use of IT; they need to situate these skills historically and educationally and need to feel comfortable, especially in these times of rapid change.

Furthermore, teachers, more than any other group need to understand, explore, and develop new pedagogical practices. As a consequence of multimedia and the Internet, there is a great deal of hype in the media about how important IT will be, but the hype may have a negative effect intimidating rather than captivating teachers. (Mason, 2000, p.2)

The potential of the world-wide web has been discussed by Carvin (1999, p.2), who argues that for teachers who don't now have, and who never have had, the Internet or the Web in their classrooms, it can be somewhat difficult to fathom the potential impact of these new networking technologies on traditional learning environments.

In a research study conducted in 2001, Kenny interviewed 200 teachers across the United Kingdom for the British Educational Communications and Technology Agency's ICT in Practice Awards. Kenny (2001, p.40) concluded that,

The people we saw had not developed good practice because they used ICT; they would be good if they were using self-stick notes. However, it was the curiosity and open-mindedness characteristic of the good teacher that impelled them to use ICT well. Using it well made them into more effective teachers.

Kenny (2001, p.40) is suggesting that the teachers who used ICT would be good at using any teaching aid, even a self-stick piece of paper. The argument follows, therefore, that using ICT cannot transform a poor teacher into a good teacher.

Barriers to implementation

Research by Davies and Leask (cited in Leask and Pachler, 1999, p.172) has identified a number of factors that have conspired to create anxiety in teachers relating to new technologies. Davies and Leask (cited in Leask and Pachler, 1999, p.172) claim that the sensational and exaggerated claims for ICT, as previously outlined in the 'Avoiding the hype' section of this literature review, have raised alarms and created false expectations in the teaching profession. Reported cases of downsizing and unemployment as the result of new ICT solutions in the workplace could create anxiety amongst teachers with the introduction of ICT in education. These fears are compounded because teachers are largely responsible for their own computer literacy. Further, there is a concern that simply introducing ICT-based learning methods will not achieve improvement. Computers could be used to ensure that students are kept on-task, rather than to enhance the learning experience. While these findings by Davies and Leask (1999) are related to secondary schools, they may provide useful indicators as to the perceptions of teachers in a Further Education institution, the subject of this case study.

65 experts in the field were interviewed by Dillemans et al. (1998, p.227), who concluded that, there are large psychological barriers to trying out and using ICT. The interview results concurred with the notion that it is difficult to change pedagogical beliefs underlying teaching, such as the student-centred or teacher-centred approach. If teachers' are unable or unprepared to change their pedagogical beliefs then they will not be effective in introducing ICT into their work. This was found to be more applicable with older teachers who had deep-rooted mental structures on the 'art of teaching'. Teachers were also found to be afraid of losing authority and control because they believe their competence in working with ICT is inferior to that of the students. The rapid pace of change in computer infrastructure and software can result in what Dillemans et al. (1998, p.228) term a 'technical

paralysis' where teachers and the school cannot keep up with the speed in progress and therefore become unable to move forward. Further barriers included an underestimation of the time that it takes for teachers to master the new technologies and blocking factors such as timetable constraints and the attitude of the principal and managers towards new technologies.

One point of view, as given voice by (Dillemans et al., 1998, p.227) is to suggest that teachers' computer illiteracy is not the blocking factor in the introduction of technology in education. The argument follows that maintaining the myth of the significance of teachers' computer illiteracy leads to psychological barriers, and hinders development. Dillemans et al. (1998, p.227), argue that the only technical skill needed is clicking a mouse on the right spot. Teachers only need the equivalent of a one-day course to be able to start exploring interesting applications and, once started, they can develop further skills in an incremental way.

In my opinion this point of view, as emphasized by Dillemans et al. (1998) oversimplifies the issues for Further Education teachers implementing ICT in the classroom. Other factors, beyond psychological barriers, that take account of the Further Education environment could also be significant. A one day course could also be inadequate in giving a Further Education teacher the confidence to guide their own learning.

Towards the 'ICT Capable' institution

A school that is competent in controlling the situations in which information and communications technology can be applied is often referred to as an 'ICT Capable School'. The ICT Capable School should be one in which a defined set of skills, knowledge and understandings are widely shared, stable and well described.

It is not possible to be fully ICT capable as computer software and technology continue to develop all the time. However expert a person may be, there are always resources or software functions that the user has not yet fully embraced. Even an expert user still has to develop new skills to keep pace with technological changes.

(Benzie, 1997, p.57) A desirable goal for a school would be to become ICT capable, although there needs to be an understanding that this is not entirely possible.

In 1998 Kennewell et al. (2000, p.12) conducted a survey of schools that had been identified as more successful than most in developing ICT capability. Questionnaires were analysed from 2,466 pupils, 450 teachers and 33 ICT co-ordinators. The research aimed to identify successful practice and to formulate indicators for success that could be used as the basis of targets for improvement. The research found that there was an important link between the ICT capability of managers, teachers and pupils. However, it was discovered that there are ways of overcoming limitations in the ICT capability of teachers and managers. ICT capable classrooms can be generated without the teacher needing a high level of ICT expertise. It was found that the distribution of resources may be the most significant factor in determining the ICT capable classroom. Further, good practice involves building on the skills that pupils have gained on their home computers. This was often found to be in direct contrast with schools where the teachers believed that they were the sole source of knowledge concerning the effective use of ICT, as this discouraged pupils from applying and enhancing the capability which they brought with them. These findings are the result of research undertaken in schools and cannot be directly applied to Further Education. However, questions can be raised as to whether the same issues for managers, teachers and students and the implications for resource allocation exist in Further Education.

The UK has a higher ratio of computers per schoolchild than almost any other country, including the U.S. Yet despite this lead and the fact that Information Technology has been on the agenda for almost 30 years, it is not clear that IT has made a significant impact on educational standards.

(Lovegrove and Wilshire, 1997, p.2)

This damning statement of the situation of IT use in schools indicates that there is a need for research in this area.

The Need for Research

Lewis (1999) has presented a paper examining the areas of need for research in technology education. Lewis (1999, p.10) argues that what is required is for the voices of teachers to be heard and key questions must include understanding how teachers feel about the level of support from their institution, principal and peers. Pedagogical thoughts and judgements need to be understood in the context of concerns about their profession. Insights into hindrances to their work may prove to be useful indicators for further research.

Davis (1999) makes the case that,

one of the challenges of research, including research into new technologies in education, is to ensure that it gets into the profession and there is a growing perception that the education profession needs to become more 'evidence-based' and draw upon educational research and good practice.
Davis (1999, p.10)

Gilbert and Green (1997, p.38) state that, "long term deep educational change must be driven by educational visions, not technological visions." This view is supported by Freeman and Capper (1999) who make a strong case for empirical research in this field.

Without asking hard questions about learning, technology remains an unguided missile... we need research to provide the best possible data upon which decisions are to be made. The research needs to be undertaken in a range of educational contexts since results are not necessarily transferable. There is no substitute for a correct focus on the true problem, however. And the true problem is not the technology. The true problem in education is helping students to learn. (Freeman and Capper, 1999, p.14)

Kenny (2001, p.40) argues that the ways of using ICT for teaching are still a matter of debate. Key questions should include: What are the strategies? What will extract maximum benefit? Does some technology work better in some subjects than others? How does this classroom technology affect classroom management? What kind of environment needs to be created in a school for learning with ICT to flourish? What is the most appropriate kind of advice for teachers in this area?"

A comparison has been made by Martinez (2002, p.97) between research that has been undertaken in schools with studies in the Further Education sector. Martinez (2002, p.98) is of the opinion that colleges have been the focus of a lot less education research and that there is an absence of a research culture in Further Education. Much of the research that is undertaken in Further Education is derived from internal reports or graduate/post-graduate projects that are infrequently published.

In summary, it has been shown that there is a lack of research in Further Education and, in particular in understanding teachers' perceptions of using ICT in addressing the question of a Further Education classroom.

CHAPTER THREE

Methodology

This chapter outlines the research methods that were used to determine teachers' perceptions in introducing ICT into their classrooms. An initial statement of the research questions is provided. Questionnaires and semi-structured interviews were used to address these questions. Accordingly, this approach indicates a methodology consistent with a mixed-paradigm, or dualist perspective. However, the discussion outlines how an emphasis was put on the qualitative paradigm with the need to discover rich, detailed data in the understanding of teachers' perceptions and experiences. The two research tools of questionnaires (Internet-based and paper-based) and semi-structured interviews are then discussed in turn. Attention is given to sampling strategies, triangulation techniques that were used to cross-validate the data and issues of validity and reliability. Finally, this chapter discusses the quality of the data, the notion of neutrality, empathy and insight, researcher bias and ethical concerns.

The Research Questions

The purpose of this research was to determine teachers' perceptions in using ICT in their classrooms. As such, the aim was to discover the lived experiences of teachers as they rejected, or attempted to integrate ICT into their classroom practices with varying degrees of commitment, application and success. The literature review had indicated three key areas that needed to be addressed in consideration of the overall aim. First, the question was asked, how do teachers use ICT in the classroom? Secondly, what is their understanding of the potential for ICT in the classroom? Thirdly, which management strategies create a meaningful structure for implementing ICT in the classroom?

The research questions were posed in a hierarchical structure. The three aforementioned questions aimed to answer the main research question: what are teachers' perceptions of using ICT in the Further Education classroom? These three

What are teachers Perceptions in using ICT in the Classroom?	
<i>Principal research question:</i>	
<i>Main research questions:</i>	<p>How do they use ICT in the Classroom?</p> <p>What is their understanding of the Potential for ICT in the Classroom?</p> <p>Which management strategies create a conducive structure for implementing ICT in the Classroom?</p>
<i>Sub-questions:</i>	<p>Do you think that your subject area can effectively be taught through the use of ICT? How can this be achieved?</p> <p>How do they consider to be the potential of CD-ROMS, the Internet, PowerPoint presentations, electronic whiteboards and other types of technology?</p> <p>Are they able to effectively use ICT for assessment purposes?</p> <p>What do they consider to be the potential for online learning?</p>
	<p>How confident are they at using ICT in the classroom?</p> <p>In what ways are they currently making use of ICT in the classroom?</p> <p>Are any of their courses delivered whole in, or in part by online methods</p>
	<p>How do perceptions differ between the Management and Teaching Staff?</p> <p>What arrangements are there for developing the ICT knowledge and skills of staff?</p> <p>Is the ILT Champions programme effective within the college?</p> <p>What barriers exist to staff developing ICT in the classroom?</p> <p>Do all staff have equal access to ICT in the college?</p>

Table 1: Research Questions

'sub' questions also formed the basis of questions for the questionnaire and semi-structured interview questions. Table 1 identifies this hierarchy of questions.

Deciding on the main research question involves a process of reducing variety and finding focus in the study. Certain aspects are brought to the fore; others are regarded as less important and left in the background or discarded. As Flick (1998, p.49) points out, research questions do not appear as if by magic. The origin of research questions lies in the researcher's personal biography, in their social context and in the literature. Everyday and scientific contexts both play an important part in determining the key research questions. Thus the research questions were drawn from several sources - the key issues that were identified in the literature, from personal experience and on a reflective evaluation of the institution.

Questions can stimulate a line of enquiry that may take the research into a profitable direction. Questions, "lead to hypotheses, useful comparisons, the collection of certain classes of data, even to general lines of attack on potentially important problems." (Strauss, 1987, p.22) The intention of the research design was to allow for further exploration of the emerging issues generated by these starting research questions.

A mixed-paradigm approach

In order to determine teachers' perceptions in using ICT in the classroom, a mixed method approach was selected that combined both the quantitative and the qualitative paradigms in a two-stage strategy. In the first stage, questionnaires consistent with the quantitative paradigm were presented to the sample of teachers. In the second stage, semi-structured interviews were conducted that are consistent with the qualitative paradigm. Creswell (2003, p.215) describes this type of mixed-method approach as a 'sequential explanatory strategy'. The purpose of the sequential explanatory strategy is to use qualitative results in explaining and interpreting the findings of the first, quantitative method. Further, qualitative data collection can be used to examine in more detail results that may appear to be surprising. An alternative approach, as acknowledged by Creswell (2003, p.217), would have been to first discover the issues and generate insights with a case study or interview, and then

check the degree to which they were distributed in a wider population through a questionnaire.

Greene, Benjamin and Goodyear (2001, p.26) posit that a mixed-method way of thinking is most appropriate for evaluation research in education, particularly as the social phenomenon we study is complex, dynamic and contextually diverse. A mixed method analysis provides a more comprehensive analytical technique than does either quantitative or qualitative data analysis alone (Tashakkori and Teddlie, 2003, p.353).

Four key reasons for adopting a mixed-method plan have been identified by Greene et al. (2001, p.30). First, through the process of triangulation, mixed methods can enhance the validity and credibility of inferences. The process of converging and corroborating the data is termed 'triangulation' and it is discussed in more detail later in this chapter. Secondly, greater comprehensiveness of the findings can result from being able to capture different dimensions of the social phenomena under investigation. Thirdly, where triangulated data conflicts more insightful understandings can be achieved. Fourthly, as mixed-methods advance different values and interests they can increase value consciousness and diversity in the research community.

The strengths of both the quantitative and qualitative paradigms, therefore, could be incorporated into the research design. The strengths of this mixed-paradigm, or dualist strategy, are associated with a straightforward approach that has clear steps to follow and to describe and report. However, the main weakness of this approach, as identified by Creswell (2003, p.215), is that the research takes longer to conduct.

Three areas in which mixed methods are superior to a single approach have been identified by Tashakkori and Teddlie (2003, p.14). First, mixed method research can answer research questions that the other method cannot. A major advantage is that mixed-methods enable the researcher to answer confirmatory and explanatory questions simultaneously. Secondly, mixed methods provide better (stronger) inferences, and thirdly, mixed methods provide the opportunity for presenting a greater diversity of views.

Another difficulty with a mixed-method approach concerns the differences in terminology that are synonymous with each paradigm. Sampling, for instance has a different meaning for qualitative and quantitative research. In the quantitative sense it means having a representative collection of cases that are drawn from a much larger population; it is based on theories of probability from mathematics. In the qualitative sense it means having a collection of cases that illuminate social life (Neuman, 2003, p.210). Validity also has different meanings for either paradigm. In quantitative terms validity refers to the match between the construct and the measure. Some measures will have a greater 'fit' to the social reality than others and, therefore, greater validity. Neuman (2003, p.185) posits that validity in qualitative terms is more about being able to give an authentic, honest, fair and balanced account of social life.

Ultimately, proponents of mixed methodologies, such as Tashakkori and Teddlie (2003, p.12), believe that a common language and nomenclature that transcends the qualitative and quantitative divide should prevail in situations where similar processes exist.

Onwuegbuize (2000, p.3) claims that the frequent polemic qualitative-quantitative debate has created a false dichotomy of purists at both ends of the epistemological paradigms. The notion of epistemological ecumenicalism is supported by Kip (2001, p.2), who argues that there is no justification for researchers in teacher education and technology to subscribe to the fixed methodological assumptions of either paradigm. According to Kip (2001, p.10), researchers in this field should use whatever methods or vocabularies suit their needs.

Philosophically, a further strength of this approach is that it facilitated both deductive and inductive reasoning. Deductive logic, the approach of traditional science involves (1) developing theories about a phenomenon; (2) deriving hypothesis or predictions based on the theories; (3) observing instances of the phenomenon to see whether the theory's prediction are borne out; and finally (4) looking for new situations in which to test, expand, or revise the theory (Palys, 2003, p.36). In contrast, inductive reasoning begins with the observations of specific uses and builds theory from this.

The first stage of this study incorporated deductive thinking by testing to see if commonly held assumptions about the use of ICT in the classroom were applicable to the organization. The questionnaire consisted of open and closed questions and the closed questions aimed to test whether commonly held assumptions in the literature were applicable to this setting. Open questions were used to allow for elaboration of the response to the previous, closed question, and to discover emerging issues. The process of systematically following organized and formally-structured sequences has also been described by Neuman (2003, p.140) as reconstructed logic. In the second stage an inductive process involved further analysis of the open-ended questions and the exploration of these issues with semi-structured interviews. As greater emphasis was placed upon the second, inductive phase, meanings could be attached to statements and new principles generated. Further, logic in practice, or logic based on judgements, or norms shared by the research community characterized this second, inductive stage.

Neuman (2003, p.141) adopts the metaphor of the researcher following a path as he or she progresses through the research process. The first stage of this study can be characterized as a linear path in that it followed a fixed sequence of steps. In the second, qualitative stage, a non-linear pathway represents successive passes that were made through the steps, often moving backwards or sideways before moving on. The process of reflection and lateral exploration of ideas gave the opportunity to explore emerging issues in greater detail than may have been possible with a solely quantitative study. Meanings could also be attached to statements made by the participants.

The intent of qualitative research is to understand a particular social situation, event, role, group or interaction. It is largely an investigative process where the researcher gradually makes sense of a social phenomenon by contrasting, comparing, replicating, cataloguing and classifying the object of the study. (Creswell, 1994, p.161)

Qualitative methods have a real advantage over quantitative methods in terms of flexibility, in that they can be changed as the research progresses (Bell et al., 1984, p.22).

Sampling

A purposive sampling technique was used for this study. May (2001, p.95) identifies purposive sampling as a selection made according to a known characteristic. In this study all subjects were full-time managers and lecturers/teachers in a further education college on the south coast of England. The argument can be made that this sample was 'fit for the purpose' given that the further education college showed many of the organizational and management characteristics of other further education colleges. National initiatives such as the ILT Champions Scheme and the ICT for Teachers Course were the same as in other colleges.

Stratified sampling, the process by which a population is separated into non-overlapping groups (Mendenhall, Ott and Scheaffer, 1971, cited in Bailey, 1994, p.92) perhaps best describes the strategy that was used for identifying questionnaire respondents. A recently published internal college telephone directory was used as a source for identifying the respondents. It was conceptualized that each person under each department listing represented a number. Number one, therefore, would represent the first person named in the departments list. Numbers were then drawn from a hat so that a random sample from each department was sent a questionnaire.

The selection of the eight interview participants was based on the personal recommendation from other interview participants. This approach is referred to in the research methodology literature as 'snowball sampling' (Palys, 2003, p.145).

Snowball sampling is based on the analogy of a snowball, which begins small but becomes larger as it is rolled on wet snow or picks up additional snow. (Neuman, 2003, p.214) The essential features of snowball sampling are that each person is linked or somehow interconnected within the organization. The process is completed when no new names are given or the researcher has reached the limits of what he or she can study. Initial interviews were conducted with people within the organization who had a professional interest in the development of ICT in the classroom. This included the Head of Business and I.T., the Professional Development Manager and the other ILT Champions. During these initial interviews the members suggested

names of other people within the organization who would be able to present informed opinions. Jotted notes were kept throughout the interview process and these included a list of potential names for future interviews. Careful consideration was then given to the selection of interviewees. The interviewees had to be able to offer a unique perspective, have a distinct perception, be representative of a cross-section of the organization or have had a unique experience in introducing ICT into their classroom. For example, one member had been to a conference and had tried to apply some of the ideas to his own practice. Another member was responsible for Special Needs students and she had attended an exhibition and was in the process of applying for a grant for some adapted computer equipment for her students. A third member had recently joined the college from a similar institution where he had had special responsibility for developing ICT skills with his staff. Other members included people with no computer experience who had taken courses to improve their skills and people with little computer experience who were unwilling to develop their skills. It became apparent in the last two interviews that new and significant information was not forthcoming and, with diminishing returns, the decision was made to withdraw from the field.

Questionnaires

In the first stage of the study, a questionnaire was employed to measure and provide data for a number of variables. These variables included personal skill level, teachers' confidence, use of CD-ROMS, PowerPoint, the Internet, online delivery, access to resources, assessments, and any other forms of technology that the teachers might have considered using. Early experience in my role as an ILT champion suggested that the teachers with whom I had daily contact in the Further Education College were at the stage of learning to use ICT in the classroom that I had recently been through and were most likely to adopt an objectivist approach to the use of ICT in the classroom rather than the constructivist approach discussed in Chapter two. This awareness that the teachers tended to use ICT in an objectivist manner influenced the content and construction of the questionnaire.

Constructivist-orientated questions about allowing students freedom to explore and to learn on their own were not included in the questionnaire. I felt that the Further Education teachers would have been unlikely to be able to answer constructivist-orientated questions, which would have been beyond their experience. On the other hand, they would be more familiar with objectivist-orientated questions.

The aim of the questionnaire was to produce both descriptive statistical data and illuminative, qualitative data. The open-ended nature of many of the questions did, as expected, create difficulties in the data analysis, and several attempts had to be made to code and interpret the responses to the questions.

Questionnaires are viewed by Walker (1985, p.48) as being easy to administer, quick to fill in, and easily quantifiable allowing for comparisons between individuals and groups. Robson (1998, p.243) points out that the key advantage with using questionnaires is that they can be completed and returned in about the same time that it takes to complete a single interview. Significant time savings can be made if the questionnaire is well constructed and if consideration has been given in advance to the coding and analysis of the data.

The main disadvantage of using questionnaires, according to Robson (1998, p.243) is that the data can be superficial. It is not possible to verify the seriousness or the honesty of the responses. The design of the questionnaire may be such that it forces the respondent to give an answer that is not entirely accurate and the size of predetermined boxes may or may not be appropriate. There was, therefore, a need to construct the questionnaire painstakingly, with careful wording, and with clear and unambiguous instructions.

The piloting of questionnaires is recommended by Oppenheim (1992, p. 64), as being essential for ensuring the quality of the data for analysis purposes. Further, the intellectual challenge of conceptualizing and re-conceptualizing dimensions of the study helps to ensure that fewer problems will be encountered, and that nothing will have been left out.

To pilot the questionnaire I asked a group of five teachers to meet in a room that held a small number of computers in the college. They were requested to complete the online version of the questionnaire. As a focus group, the group then discussed the structure, content and range and type of questions. This evaluation process lasted for approximately one hour during which field notes and paper corrections to a printed version of the questionnaire were made. As a consequence, modifications were made to the sequencing of the questions and it was suggested that the skills required to use ICT in the classroom should be identified as 'desirable' and 'essential'. It was further suggested that definitions be given with each of the response sets to the questions that pertained to personal skill level, and level of confidence, in using ICT in the classroom. The discussion helped to determine the most appropriate statements for these short definitions. For example, lacking in confidence was defined as 'confident with only simple tasks'.

One of the college managers, who was present at this piloting session, requested that a question be removed from the questionnaire. This question asked participants about their perceptions of the Teachers' Course that was being offered as part of the staff development programme in the college. This qualification had not been offered to all staff. Candidates for the course were recruited through a competitive application process on the criteria as to which of them would most likely be committed to the course, benefit from its objectives and implement ICT into their professional practice. As a small number of participants had been recruited, the manager felt that restricting perceptions of the course to course members would be more worthwhile and avoid offending those not chosen. Consequently, the question was removed and semi-structured interviews were conducted with the course candidates and those responsible for its implementation. Initially the questionnaire was published on the Internet and respondents were requested via e-mail to complete the questionnaire and submit it online. The selection of subjects is discussed later in this chapter along with the sampling strategy. The intention with publishing the questionnaire on the Internet was to capture the spirit of innovation with IT and to develop a new and emerging research tool.

The benefits with publishing a survey on the World-Wide Web have been determined by Schmidt (1997, p.274). The cost savings in both time and money associated with publishing a survey to a large population are perhaps the greatest benefits. The information can also be presented in a format that was previously difficult to achieve. The data entry stage is eliminated for the survey administrator and data entry software can ensure that the data is free from errors. Measures can, therefore, be taken to ensure that duplicate responses, web-based abuses, missing data and unacceptable responses do not occur.

Underwood, Kim and Matier (2000, p.20) make the case that there exists somewhat of a void in the research literature on the topic of electronic surveys. However, as Solomon (2001, p.1) points out, web-based surveys are becoming widely used in social science and educational research. Further, survey researchers have much to learn about the efficacy, methodological challenges and subtleties of this approach.

From the outset there was an understanding that a considerable amount of time would be required in designing and piloting the questionnaire, making it suitable for use on the Internet and in testing it online. However, I felt that once established, there would be time savings in the entry of data into either the SPSS (once "Statistical Package for the Social Sciences", then "Statistical Product and Service Solutions", and now just "SPSS") or QSR NUD*IST (Non-numerical Unstructured Data; Indexing, Searching and Theorizing) computer software and its subsequent analysis.

Many design, technical and pragmatic challenges had to be confronted in getting the online questionnaire to a point where respondents could be contacted and asked to complete the questionnaire. Although I designed the questionnaire and its associated web-pages, the services of a web-designer and database analyst were required with some technical difficulties that occurred in the testing phase. The Microsoft FrontPage software was used in the design of the online questionnaire and its supporting web-pages. The questionnaire was designed in such a way that clicking on the 'submit' button at the end of the questionnaire would send a string of data to my e-mail address. I would then 'cut' and 'paste' the quantitative data into SPSS (version 11)

and the qualitative data into SPSS (version 4). Attempts were made to have the data sent directly to an online database, rather than to my e-mail address, but this was ultimately considered to be costly, time consuming and unnecessary. At the time the college was making a transition from Netscape to Internet Explorer so the webpage was tested and designed to work in both browser formats.

Security, confidentiality and corruption of the data were further considerations with the online questionnaire. A password coding system was initially attempted with the web-page but, when presented to a web-page professional designer for consultation he had no difficulty in breaking the password. Consideration was then given to the function of the password. It was felt that it was not necessary to stop people getting to the questionnaire as the questions were not confidential. However, it was anticipated that the data could be corrupted by either an undesirable person in the public domain completing the questionnaire or a respondent pressing the 'submit' button on more than one occasion. Each subject was sent a request to complete the questionnaire using a unique username. In this way I could verify that when the data reached my e-mail it had not been sent twice and was from a genuine subject. A dichotomy therefore arose between protecting the quality of the data and maintaining the anonymity of the responses from the researcher. In this instance it was considered to be more important to protect the integrity of the data. Once established online, the website and questionnaire had to be checked on a regular basis to ensure that it was still available and in good working order.

The online questionnaire was a spectacular failure, as only one person responded after the requests were sent out. Follow-up questions were posed to five of the potential respondents to find out why they had not returned the survey. The respondents did not mention the issue of anonymity from the researcher, but thought that it was "for information only", "entirely optional" or that they were "distracted with other e-mails", or just too busy to complete it. Given these responses, I felt that it would not be worthwhile sending out reminders due to the lack of responses. This strategy was abandoned and a paper-based version of the questionnaire was mailed-out instead. The mailed-out questionnaire could, of course, guarantee anonymity from the

researcher. Four months after abandoning the online questionnaire a data string arrived in my e-mail, indicating that a respondent had just completed the questionnaire. In response, thanks were sent, it was acknowledged that it was too late to process the data and the questionnaire was removed from the Internet. It is interesting to note that, according to Solomon (2001, p.2), studies are currently being undertaken to determine the optimal structure and format of the web-based survey. The outcome of these studies may help to determine the efficacy of this approach for small-scale research.

Had more respondents completed the online questionnaire then, with the application of statistical analysis, it may have been possible to determine if significant differences existed between the Web-based survey and the traditional pen-and-paper survey. Such analysis was not possible as there was only a single respondent to the Web-based questionnaire. Therefore, abandoning the Web-based survey and the use of the paper-based survey represented a change in methodological approach.

The printed questionnaire assumed the same format and questions as the web-based versions. Minor alterations had to be made to some of the response options; on the web-based version 'drop-down' menus had been used for some of the categories of response options. These options menus were converted to tables in the paper-based version so that all of the response options could be clearly displayed. Eighty paper-based questionnaires were mailed out and 70 were returned, indicating a response rate of 88%. The questionnaires had a cover sheet that included a statement of anonymity and confidentiality. The first question asked the participants to identify themselves as either management or lecturer. Although all of the managers had some teaching duties, they were all on a different contract of employment from the teachers, making this distinction possible. Further questions examined the variables of skill level and confidence in using ICT in the classroom. Oppenheim (1992, p.150) notes that as perceptions are concerned with states of mind, they are multi-faceted and more complex than facts. The use of multiple questions, or a scaling approach, is indicated in validating the use of questionnaires for assessing perceptions. Likert scales were used to ask the participants to identify themselves as non-confident, lacking in confidence, confident, proficient and advanced. Definitions were given with each of

the classifications of the Likert scales. Oppenheim (1992, p.200) views Likert scales as having good reliability and suggests that they are easy to construct. Subtler and deep ramifications of an attitude can be explored and this style of question tends to be preferred by respondents. A key disadvantage for Oppenheim (1992, p.200) is that a neutral point on the scale may not represent the mid-point for attitudes on the pre-determined scale. The structure for the remainder of the questionnaire involved 'yes/no' category questions that were followed by requesting a comment. For instance, "have you considered putting your course online?" was followed by "If yes, how could this be achieved?" Other questions asked entirely for perceptions, or comments, on implementing a particular form of technology.

Interviews

The second stage of the study involved a series of eight semi-structured interviews. With this study, there was a need to discover information of a deep, investigative and searching nature. The research intended to draw information from the subjects that they considered to be of particular relevance to themselves and drawing on their own experiences. The opportunity to explore new avenues highlighted by the subject was seen as important.

Important themes and lines of enquiry were further explored with the use of semi-structured interviews.

A semi-structured interview schedule tends to be one of the most favoured by educational researchers as it allows the respondents to express themselves at some length, but offers enough shape to prevent aimless rambling.
(Wragg, cited in Bell et al., 1984, p.184)

Drever (1995, p.3) makes the case that semi-structured interviews can produce high quality data, but can also be extremely time consuming. According to Gall et al. (1996, p.289) questionnaires have the advantage in that data can be quickly obtained from a large number of people. The disadvantages are that once distributed it is not possible to modify the questions, even though they may be unclear to some of the respondents, and they cannot probe deeply into respondents' opinions and feelings.

However, in this study it was possible to follow up on illuminative data through the use of semi-structured interviews.

The eight interviews typically took between 45 minutes and 1 hour 30 minutes to conduct. A meeting room in the college was used for this purpose and the interviews were tape recorded for later transcription. A prepared sequence of interview questions was followed, but modifications to the questions were made according to the member's department and whether they were a teacher/lecturer or a manager. Additional questions aimed to seek clarification and meaning or to follow a new line of enquiry. Appendix ii provides a transcript of one of the interviews. The interview with John has included so that it is possible see that excerpts are not misplaced or taken out of context.

Robson (1998, p.229) concurs that the face-to-face interview offers the possibility of modifying one's line of enquiry, following up on interesting responses and investigating underlying motives in a way that postal and other self-administered questionnaires cannot.

The interviews repeated one of the questions that had been presented in the questionnaire. This question asked respondents to classify a list of pre-determined skills that may be required to teach ICT in the classroom as either 'essential' or 'desirable'. The inclusion of this question had been as a result of a recommendation in the piloting phase. The analysis of the essential/desirable question had failed to produce a clear pattern to the data. However, the same question repeated in the semi-structured interviews elicited detailed responses and prompted the exploration of new themes.

Triangulation

Triangulation is a technique used in research for the cross-validation of information. Triangulation can be defined as, "collecting information from several sources about the same event or behaviour." (Hittleman and Simon, 1997, p.232) Triangulation is

essentially about the use of multiple data methods, data sources, analysts or theories to check the validity of findings. The intention with a triangulation approach is to use different methods so that they may converge on one interpretation thereby enhancing credibility to other interpretations that may have been suggested by only one method of investigation. This study used a variety of methods (questionnaires and semi-interviews), so that I could be more certain of the conclusions. Anderson (1998, p.159) points out that triangulation is used to interpret findings, test alternative ideas, identify negatives cases and point the analysis towards a clear conclusion based on evidence collected. Findings based on conclusions suggested by different data sources are far stronger than those suggested by one alone. Triangulation is a term with multiple meanings and is often referred to as mixed-method or multiple strategies.

According to Denzin and Lincoln (1998, p.199) the origin of the term triangulation is probably "multi-operationalism". That is, multiple measures, which ensure that the variance reflected is that of the trait or treatment, and not associated with the measures.

In its original sense, triangulation is a technique of physical measurement. Triangulation, in surveying, is a method of finding out where something is by getting a 'fix' on it from two or more places. Mc Fee (1997, p.216) prefers the image of a sailing ship in coastal waters taking bearings on, say, a church spire, a hill top, and a water tower. Where the bearings intercept pinpoints one's location. Brown and Dowling (1998, p.9) and Lincoln and Guba (1985, p.305) adopt the metaphor of a police or military procedure of using geometry to locate an illicit or 'enemy' radio transmission from direct readings at two reception points.

There is a fundamental difference, however, between assumptions that are being made in the detection of a radio position and educational research contexts. Essentially, the assumption is made that the radio transmitter has a unique location that will be revealed by the triangulation process. It is possible to make the assumption because there is already a co-ordination between the methods employed. The means of

defining the locations of the transmission point and the reception points are coincident. Nothing is measured that is not already encoded into the practice.

The situation in educational research is, generally, very different. Different methods, which were not pre-encoded in the same way, were used. The act of taking up the position of the observer entails a necessary break with that which is being observed. The observational 'position' is to be defined in a way that is distinct from the position being observed. In this study I was not distinct from the research setting.

Scott and Usher (1996, p.150) argue that the use of triangulated methods demands that like is compared with like. But researchers do not and cannot triangulate at the same moment, so the comparison that is made is between perceptions, conceptions and descriptions of evolving structures at different times.

There is no position or method that can be adopted in research which gives an indisputably clear view of the empirical field (or any emerging setting within it) under investigation and about which statements are to be made. There is no such thing as a correct method, or even the best method, for addressing a particular research interest or question. This does not, however, mean that all methods and positions are as good as each other for the purposes of empirical research. Triangulation is, therefore, commonly used in response to the inevitable shortcomings of any particular approach.

Denzin (1970, p.301) determined that there are four types of triangulation. All have the same function, which is to reassure the researcher about the reliability, validity and generality of their findings. These four categories of investigator, theoretical, methodological and data triangulation are widely cited in texts on triangulation (Burgess 1984, p. 145, Kane 1990, p.52, Hitchcock and Hughes 1995, p.324, Robson 1993, p. 291, Cohen and Manion 1994, p.233), whilst others have elected to use abbreviated versions of the same categories (Hittleman and Simon, 1997, p.232). Investigator triangulation involves the use of more than one observer for the same object. Theoretical triangulation incorporates more than one kind of approach to generate categories of analysis. Methodological triangulation is referred to by Kane

(1990, p.52) as not only the use of different research techniques, but also the use of different forms of the same technique, such as applying different questionnaires to the same respondents. This study involved methodological triangulation in the sense that two different methods were used, one of which was data triangulation.

Data triangulation

Data was drawn from different participants involved in the study, from different stages in the activity of the setting and with different methods. The triangulation of data from different sources has the advantage of allowing for a considerable extension of depth and description. Insights that rely on one source of data are likely to be limited.

The results of the questionnaire were used to inform the question design of the semi-structured interviews. However, this data was also entered into the NUD*IST software with the data from the semi-structured interviews. Triangulation therefore was useful in comparing data gained from the different stages of fieldwork, to check if any issues had been neglected or over emphasised. This process of systematically triangulating the data did give me more confidence that the research was focusing on the research questions.

Ontological Perspectives of Data Triangulation

Triangulation, as espoused by the metaphors in this chapter, implies that there is one objective and knowable social reality, therefore all that social researchers have to do is to work out which are the most appropriate triangulation points to measure it by. Scott and Usher (1996, p.151) point out that triangulation can only be sustained within the framework of a realist ontology.

Furthermore, if researchers decide to triangulate, they are assuming that their methods (and these would include how close the researchers are to their sources of data) do not determine the type of data that is collected: that method is in some sense independent and thus can be discussed, modified and manipulated in isolation from, and without reference to those data. (Scott and Usher, 1996, p.151)

A post-modernist perspective would argue against the existence of a 'fixed point' or indeed 'three-sides' from which we oppose the world. Denzin and Lincoln (1998), propose that,

The central image for "validity" for post-modern texts is not the triangle - a rigid, fixed two-dimensional object. Rather, the central image is the crystal, which combines symmetry and substance with an infinite variety of shapes, substances, transmissions, multidimensionalities, and angles of approach. (Denzin and Lincoln, 1998, p.358)

Crystals, it can be argued, grow, change and alter, but are not amorphous. Looking into a crystal the observer can see different colours, patterns and arrays depending upon the angle of repose. The process of crystallisation, therefore, deconstructs the traditional notion of validity and can provide a deepened, complex understanding of the topic without loss of structure.

Quality of the Data

Errors can occur in 'keying-in' the data. Further, a questionnaire response may be missing. A complete data set is clearly desirable and steps were taken to ensure this with the piloting of the questionnaire. Robson (1998, p.315) points out that there is no really satisfactory way of dealing with missing data. Further, there may be reasons why the respondent has failed to answer the question. The respondent may have genuinely missed the question, or perhaps he or she is trying to communicate.

One of the questionnaire respondents ignored the 'yes', 'no' category and wrote 'not yet' to a question that asked if they had considered putting their course materials online. In this case the response was recorded as a 'no' to indicate the current position of having not attempted to put course materials online and the intention to put materials online in the future was coded with the data in the NUD*IST program for later qualitative analysis. Other missing questionnaire data was subscribed a missing code in SPSS.

Inconsistencies were found in the analysis of some of the interview transcripts. For instance, one of the members stated at the outset of the interview that she had no experience in using ICT in the classroom. Upon reflection, she revealed how on four different occasions she had used PowerPoint in the classroom. In this situation the initial comment was ignored and the PowerPoint use was coded to the NUD*IST document.

Descriptive statistical data was produced from the questionnaire. The data from the semi-interviews, however, could generally consider to be 'rich', or in-depth.

The Coding and Analysis of the Data

Questionnaire data that was derived from questions with a yes/no response or Likert scale was coded into the SPSS software program. Descriptive statistical data was then ascertained and tables for further analysis were constructed.

The interview tapes were listened to repeatedly in order to determine the relevant data for transcriptions. This was an intuitive process based on the relevance of the response to the questions. The relevant data was transcribed into Microsoft Word, although it was saved as a text file as required for data entry into the QSR NUD*IST software. These text files can then be coded through a structure system of nodes. Each segment of text can be coded to a node and then the text held within a node can be viewed in its entirety. The nodes can be arranged hierarchically (tree nodes), or non-hierarchically (free nodes). The transcribed documents were, therefore, coded to a hierarchical structure of nodes. The variables that had been identified in the variables section of this chapter were used as a basis for these nodes. Figure 2 shows the hierarchy of nodes.

The three key sub-questions of the study concerned teachers' use of ICT, their understanding of the potential for ICT, and management issues. Codes, or nodes, were clustered under each of these broad categories.

The code of 'skill level', 'confidence in using ICT' in the classroom, the 'current use of ICT' and 'online delivery' were developed under the first cluster heading of ICT use. 'Skill level' defined a teacher's ability to use computer software applications such as word-processing, e-mail, spreadsheet and PowerPoint. Online delivery questioned whether the teachers had considered putting their course materials on the Internet and asked how this could be achieved.

Teachers' understanding for the potential of ICT in the classroom, the second cluster heading, categorized the two codes of 'effective delivery' and 'assessment purposes'. The effective delivery variable aimed to reveal teachers' understanding of the application of ICT to pedagogy. The code of assessment purposes examined if technology was used for assessment purposes and the potential of ICT for assessing students' work.

The third cluster of variables examined issues of how the college managed the implementation of ICT in the classroom. Management perceptions, and staff perceptions were recorded together in order to examine similarities and differences under the variable of 'management and staff perceptions'. The 'staff development' code looked at the arrangements for developing the ICT knowledge and skills of the staff. This included the evaluation of an ICT for Teachers Course that was currently being piloted in the college. The barriers code examined factors that would prevent a teacher from implementing ICT in the classroom. The barriers code included teachers' perceptions of incentives and disincentives for using ICT in the classroom. The final code in this cluster was termed 'access issues'. The access code identified issues of having access to technological equipment, the setting-up of equipment and the role of technicians.

Assigning text to nodes was difficult and many attempts were made to code and re-code the data. Typically, the problems were compounded where the data could fit into more than one node. A further issue arose where there seemed to be no appropriate place to record sections of text on a recurring theme. Consequently, a free node was used to categorize data around the theme of 'job satisfaction' that can be

derived from using ICT in the classroom. This node remained a 'free' node as it had no obvious place in the hierarchy.

The process of taking the data from the transcribed documents and reorganizing it into categories, or node in case of QSR NUD*IST has been described by Tesch (1990, p.122) as 're-contextualization'. The process of coding data into categories is viewed by Strauss and Corbin (1998, p.113), as being important because categories have analytical power and the potential to predict. Weitzman and Miles (1995, p.256) highly commend the ability of QSR NUD*IST for its flexible hierarchal structure and its ability to reorganize data. A further strength of QSR NUD*IST, as identified by Miles and Huberman (1994, p.312) is that it allow memos, or annotating of the text. Thoughts, impressions and interpretations of the data were included with the use of the memo function, thus facilitating the processes of theory building and reflection.

Kelle (1995, p.3) points out that computers in qualitative analysis can be of great assistance with the mechanical tasks involved in interpretive analysis. Further, the computer program can help in keeping track of emerging themes, ideas and concepts. Despite these advantages, the issue of data overload that confronts all qualitative researchers remained problematic.

Issues of Validity and Reliability

The triangulation of data aims to enhance the validity of the research design. By using two research methods, it was anticipated that the questionnaires would validate the semi-structured interviews if similar responses were given by both methods. According to Cohen and Manion (1994, p.281), convergent validity (triangulation) exists where similar data is recorded by both methods.

It is impossible to avoid the confounding effect of methods on our measurements. With a single method, some unknown part or aspect of the results is attributable to the method used in obtaining the result. Single methods are neither atheoretical nor neutral. Because we can never obtain results for which some method has not been used to collect them, the only feasible strategy is to use a variety of methods.

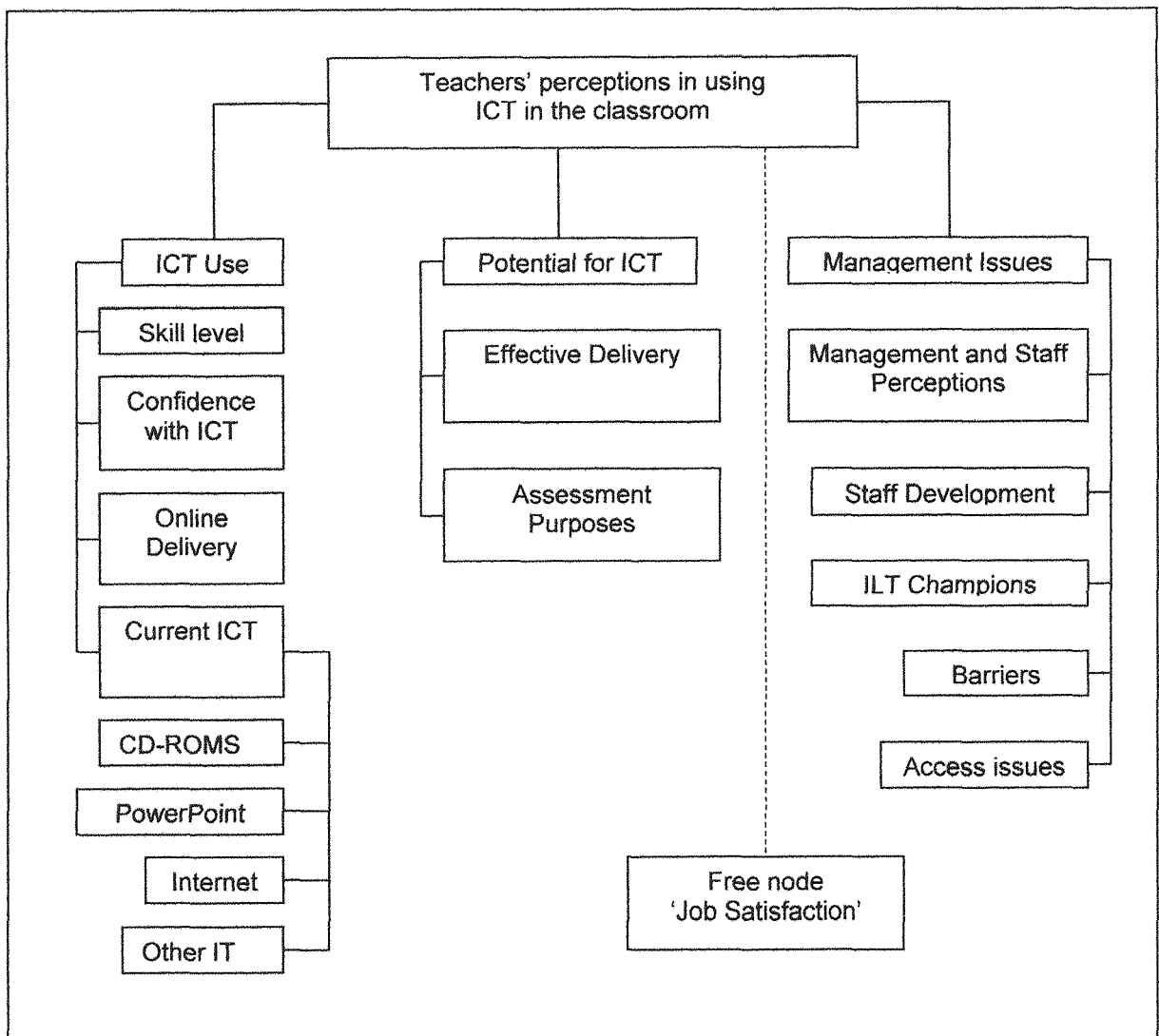


Figure 2 – Hierarchy of nodes

This position is supported by Anderson (1998, p.150) who argues that, "with proper triangulation it will be difficult to refute conclusions which follow logical and multiple data sources. Interpretation of data is also improved when multiple stakeholders are involved in reviewing its meaning." Sometimes, it is the case that the data itself is suspect, often because the instruments were poorly developed, important sources of data were ignored in the workplan, or the data were not collected with care. Validity is much improved through the multiple sources of data for each question.

The most significant advantage of using multiple methods has been termed by Robson (1998, p.289) the 'reduction of inappropriate certainty'. Using a single method and finding a clear-cut result may delude investigators into believing that they have found the 'right' answer. Multiple methods may, therefore, point to answers that remove specious certainty. Unfortunately, different results across methods can cause confusion and uncertainty.

I felt that the QSR NUD*IST program simplified the triangulation process as a set of data for each code that could easily be viewed, compared and analyzed for consistency and differences in the data. Consideration would then be given as to whether the methods themselves had created the differences and similarities or the meaning of the differences in the research context.

When the findings of different methods agree, we can be confident about the validity of the investigation. However, when two reliable methods yield conflicting results, the validity of each is cast into doubt. The opposing argument is to suggest that such contradictions are useful in that they allow the opportunity to assess each method's validity in the light of other methods. Therefore, great care was taken to consider both conflicting and confirming data. I felt that in the cases where conflicted data existed this was often because of differences of opinion on the same matter. Consistency perhaps best characterizes the convergence of data in this study.

Evidence produced by a multi-method approach may be more compelling and intuitively more persuasive than evidence from a single method approach. However, as Brewer and Hunter (1989, p.18) point out, intuition can be misleading. Even strongly agreeing multiple measures can be wrong if undetected sources of error affect each method equally.

All of the interview members were asked if they would assist with respondent validation, in checking the transcribed data. Three of the members declined, citing the pressure of work, time commitments and a trust in the researcher's abilities. Guba and Lincoln (1985, p.374) indicate that respondent validation, or member checks, are

important for verifying both the factual and interpretive accuracy of the data. Further, member checking improves the trustworthiness or credibility of the data. Although the full respondent validation may have been desirable, it was acknowledged that the rights of the participants are of primary importance (Oppenheim, 1992, p.84). However, the debriefing of the semi-structured interview participants included a re-statement of confidentiality and anonymity, as well as summarizing the main points of the interview. Newman and Benz (1998, p.69) suggest that a debriefing process is a technique that can further enhance validity.

Empathy and Insight

The positivist approach to research would argue that the researcher should be objective and distinct from the research and that a quantitative design should seek to control the influence of the researcher on the data. The anti-positivist, qualitative perspective posits that the researcher cannot be removed from the data and it is desirable that the researcher makes explicit their relationship with the research. As Krieger (1985) argues, “We need to link our statements about those we study with statements about ourselves, for in reality neither stands alone”. Krieger (1985, p.321)

The empathetic nature of the researcher is an important quality in qualitative enquiry. The phenomenological doctrine of *verstehen*, which means “understanding”, refers to the researcher’s ability to make sense of the world.

The *verstehen* doctrine presumes that because human beings have a unique type of consciousness, as distinct from other forms of life, the study of human beings will be different from the study of other forms of life and non-human phenomena. The capacity for empathy then is one of the major assets available for human inquiry into human affairs. (Patton, 1990, p.56)

The phenomenological perspective emphasizes that it is not possible to separate the self from the research. Further, by understanding something of the context in which the data occurs, the audience can fully understand the researcher’s interpretation of text data (Sword, 1999, p.270). The process of locating the ‘self’ in the research does not lessen the credibility that is derived from following the scientific steps and principles of qualitative research (Sword, 1999, p.277), rather it can enhance it.

The following sections show how I attempted to reflect and understand my own position in relation to the data and remain neutral at the same time.

Credibility in research requires the investigator to locate the 'self', and to recognise personal biases whilst remaining impartial at the same time. Patton (1990) uses the term neutral, rather than impartial to mean that,

... the investigator does not set out to prove a particular perspective or manipulate the data to arrive at predisposed truths. The neutral investigator enters the research arena with no axe to grind, no theory to prove, and no predetermined results to support. Rather, the investigator's commitment is to understand the world as it is, to be true to the complexities and multiple perspectives as they emerge, and to be balanced in reporting both conforming and disconfirming evidence. (Patton, 1990, p.55)

Researcher Bias

Cohen and Manion (1994, p.281) suggest that the most practical way of achieving greater validity is to minimise the amount of researcher bias. Sources of bias can be the characteristics of the interviewer, the characteristics of the respondent, and the substantive context of the questions. To overcome some of these issues I was careful not to offer opinions or attitudes, and throughout the semi-structured interviews I asked only open questions while attempting not to elicit a positive or negative response through my verbal and non-verbal communication. Attempts were made to sustain neutral body language and facial expressions throughout the semi-structured interviews.

In the 'Background to the Research' section I have outlined how I became an 'ILT Champion' and, as news of my research interest spread through the organization I was asked to deliver staff training sessions and to make presentations on the progress of this study. Further, I sat on committees representing the issues that staff had in implementing the use of ILT in the classroom. Much of this representation came as a consequence of doing the research but being seen as an expert in the field created tensions in the research. On the one hand an acquired knowledge is necessary in

order to understand the issues and develop insights. On the other hand, it is recognized that the process of stating acquired knowledge can influence the data. Understanding how researchers' values influence the conduct and conclusions of a study is a primary concern for qualitative research and it is commonly referred to as inherent reflexivity. (Maxwell, 1996, p.91)

Clearly, there were significant benefits to the organization from my involvement in the research. In essence, the organization was providing a form of indirect sponsorship and the issues of research bias here would be similar to any researcher in a sponsorship situation. The focus of the study and design of the questionnaire I have already intimated was limited to an objectivist approach. This it could be argued biased the findings and prevented the emergence of data that commented upon constructivist approaches to the use of ICT in the classroom. It can also be argued that a systematic approach to data collection and analysis limited the influence of researcher bias. It is my contention that my own position, working alongside the subjects, gave me the advantage of being able to understand in detail some of the issues being raised and enabled me to categorise the data where someone without this understanding of organisational matters might have found difficult. It is also acknowledged that people as research instruments are subjective in nature and bias may be implicit in the design of the questionnaires and semi-structured interview schedule.

Ethical Issues

Gaining permission to undertake this study involved a number of internal meetings and internal memos through which the modus operandi was established. Stimulating interest and an awareness of the research was seen as important in being able to elicit a good response rate for the questionnaires, and in the recruitment of members for the semi-structured interviews.

A number of ethical concerns arose during the research period. Some of these stem from the nature of the research itself. The evaluation of individual perceptions from

within a single organization meant that an individual might reveal information that could harm or enhance an individual's status within the organization. For instance, a teacher may reveal instances where the use of technology in the classroom had resulted in poor pedagogy, information that could affect their standing in the eyes of others and thus their employment status. Further, the potential existed to criticize a colleague, line-manager or subordinate. The researcher needed to be aware of these problems. Therefore, anonymity was considered to be of the utmost importance in this situation.

Bell et al. (1984, p.100) point out that, "If anonymity is sufficiently impenetrable to disguise the participants, even those close to the situation, then, it is doubtful whether it can feed reflection and action within the situation itself. The study becomes less true as it has to be distorted."

The intention was always to produce a true and accurate representation of teachers' perceptions in introducing ICT into their classrooms. However, striking a balance between giving anonymity and sustaining true reflection became problematic in the data analysis and presentation. For instance, giving a description of a teacher's department and a tension within their professional life may be sufficient to identify that person in the research. Therefore, department names and situations that were clearly individually experienced had to be disguised.

Ethical issues and concerns can be subtle yet extremely complex, and frequently place educational researchers in moral predicaments which may appear to be unresolvable. (Cohen and Manion, 1994, p.347) Reflective field notes identified political tensions and dynamics that existed within the organization and the concern that the publication of this work with a misplaced department name could harm an individual. During two of the interviews the members asked for the tape to be turned off while they made a sensitive comment that they wanted to express but not have recorded. I wrote in my field notes that some of the most revealing data had been forthcoming, but because of ethical issues, this data could not be included in the study. It is interesting to note that this occurred on two different occasions. One of the participants gave a rationale for

having the tape turned-off as she was making a direct criticism of another individual that she felt needed to be expressed. She wanted to be sure that this information would never be made public. Reassurance of anonymity was given at this stage and it was reaffirmed to the member that she was free to finish the interview at any time. As a result of the requests to turn the tape off, consideration was given as to whether a tape-recorder should continue be used as a method of data collection. As the benefits for transcription seemed greater than the potential loss of data, the tape recordings continued for the final interview.

All researchers have to confront the ethics and politics of empirical enquiry. Denzin and Lincoln (1998, p.37) state that research usually follows one of the five ethical stances of absolutist, deceptive, consequentialist, feminist or relativist.

The *absolutist* stance regards any form of disguised research as unethical. Social scientists have no right to invade the privacy of others and only behaviours and experiences which happen in the public domain should be studied. This is diametrically opposed to the *deception* model that argues that researchers should use any method necessary in order to obtain greater understanding of a situation. This may involve lying, misrepresenting yourself to others and using adversarial interviewing techniques. This position is contrary to the ethical guidelines provided by the University of Southampton and these methods were not used in this study.

The *relativist* model posits that the only reasonable ethical stance is dictated by the individual's conscience. This framework is connected to feminist and consequentialist models as the researcher is directed to open, sharing relationships with those being investigated. No single ethical stance can be adopted as each research situation is unique.

The contextualized-consequentialist model builds on all of the aforementioned models with the exception of the deceptive stance.

Mutual respect, noncoercion and nonmanipulation, the support for democratic values and institutions, and the belief that every research act implies moral and ethical decisions that are contextual. Every ethical decision, that is, affects others,

with immediate and long-range consequences. These consequences involve personal values held by the researcher and those studied. The consequentialist model requires the researcher to build relationships of respect and trust that are noncoercive and that are not based on deception. (Denzin and Lincoln, 1998, p.38)

This study concurs with the contextualized-consequentialist model. The notion of neutrality, informed consent, a recognition of personal biases and an appreciation for the long-range consequences of research decisions reflect the ethical stance of this study.

CHAPTER FOUR

Analysis and Discussion

This chapter reports and discusses the findings of the study. The findings in the questionnaire and interviews are integrated and presented in a similar sequence to the review of literature. In so doing, I will also be referring to the three main research questions as stated in table 1. First, consideration is given to the current use and potential for ICT in the classrooms of this further education college. This includes an analysis of teachers' perceptions of the move towards constructivist theories of learning. The different types of ICT that can be used in the classroom, such as PowerPoint, the Internet, CD-ROMs, and 'Other Forms of ICT', are discussed in turn. The issues of putting course materials online and the use of the ICT for assessment purposes follows. Secondly, managing the development of ICT (ILT) in a Further Education College is discussed. Teachers' and managers' perceptions of the development of ICT in the college are considered and staff development issues and barriers to implementing ICT in the classroom analyzed. Thirdly, the discussion examines the extent to which the use of ICT in the classroom impacted on the job satisfaction of the teachers. Finally, the chapter draws together the findings to discuss emerging trends and patterns.

Department	n	percentage
Business Management	5	7.1
Building and Construction	4	5.7
Computing and IT	3	4.3
Engineering	7	10.0
Hair and Beauty	4	5.7
Health and Social Care	4	5.7
Hotel and Catering	4	5.7
Languages and Curriculum Development	12	17.1
Media and Journalism	8	11.4
Motor Vehicle	6	8.6
Occupational Health and Safety	4	5.7
Sport, Travel and Tourism	6	8.6
Other	3	4.3

Figure 3: Respondents by department (N = 70)

The current use and potential for ICT in the classroom

ICT and Constructivist Theories of Learning

The literature review made the case that teachers are now required to transform their traditional classroom delivery methods into an innovative, collaborative, enabling paradigm. Constructivist learning, according to Huang (2002, p.29) requires students to be actively engaged in using the technology to build knowledge cumulatively. An assumption was made that while the teachers may not use the term 'constructivism' in their responses, they may identify elements of constructivism in their responses. Indeed a recurring opinion was that ICT can accommodate different learning styles, language abilities and age ranges. The way in which materials can easily be changed and adapted to suit the needs of the individual student or group was seen as a key justification for using ICT in the classroom.

Two of the interviewees acknowledged that incremental learning can be developed that allows advanced students to jump to a higher level. Another respondent acknowledged the advantages for both lower and higher abilities.

“Students of lower ability have thrived using ICT. It builds confidence. Higher level courses enjoy utilizing different search engines and the quality of work presentation that can be achieved.”

This builds on Ayerst's (2000, p.2) view that ICT allows information to be presented in different formats for different audiences. The appeal of ICT was considered to be different for younger and more mature students.

“Mature students tend to be nervous of IT; younger ones love it or loathe it. Computers should be in all classrooms, rather than having to book a specific room.”

The data therefore supports Humule's (1990, p.13) ideas that different learning speeds and styles can be accommodated through ICT. In the learning of languages it was felt that ICT would have the greater appeal to younger students. However,

“... such skills as listening, discussion, response, feedback etc are not being used by the student. Different language is required by different groups.”

A consensus emerged that ICT provided variety and stimulus in the classroom and, used appropriately, it could support the individual tutor's skills and strengths. There were some discrepancies in the perceptions of students' affinity towards ICT. One member claimed that, "most students love it", yet another stated that, "the students would be more interested as a whole, but there may be one or two who would not benefit from this because of their dislike of IT."

A basic tenet of constructivism is that the learner should have a say in what they are to learn. (Dalgarno, 2001, p.184) It can be argued that giving a PowerPoint presentation that is entirely controlled by the teacher, does not represent a transition in pedagogical ideology. However, as Dalgarno (2001, p.184) points out, there is disagreement as to what constitutes constructivism. Radical constructivism would concur with the stance that constructivist learning is not possible through viewing a PowerPoint presentation; radical constructivism requires the learner to be in control of the learning situation, with only limited support from the teacher. At the other end of the continuum, it can be argued that the cognitive processes associated with reflecting on the points raised in a PowerPoint presentation could constitute constructivism.

Radical constructivism is, perhaps, best illustrated by students using the Internet in the classroom situation, clicking hyperlinks and guiding their own learning. The Internet, therefore, may represent a greater ideological change than the use of PowerPoint, because it requires a departure from traditional teaching approaches.

PowerPoint

The questionnaire asked the teachers how often they used PowerPoint in their teaching. 51% (n=36) indicated that they never used PowerPoint in their teaching and only 6% (n=4) that they used PowerPoint on a frequent basis. The use of PowerPoint appears to be low, given that the interview participants expressed a strong desire to use this technology on a very frequent basis. The barriers to using PowerPoint in the classroom are discussed later in this chapter. According to Hulume (1999, p.13) PowerPoint has the advantage of being able to bring a colourful, intense, audio-visual experience to the classroom. The questionnaire responses and semi-structured

interviews indicated wide support for the use of PowerPoint in the classroom. It was felt that PowerPoint was an ideal aid for giving professional presentations because they have clarity and visual impact and are enjoyable to watch. The option to animate slides can create interest and improve motivation. One of the questionnaire respondents noted that it can change the aspect of the teacher from looking at a board, while writing with pen or chalk, to focusing on the class and, therefore helping to maintain discipline. It was also acknowledged that PowerPoint presentations can be used to show development, they can easily be updated, the quality of diagrams is enhanced and numerical steps can be shown with a series of slides. Participants had also created handouts from the PowerPoint slides and these were thought to be particularly useful for foreign (overseas) students with learning difficulties.

The appropriate use of PowerPoint was considered to be important. A repetitive slide design, or excessive animation, could be distracting and it was determined that it should only be used where it matched the objectives of the lesson. The respondents further indicated that it was a difficult medium to rely on, and they would often have handouts or have copies of the slides on acetate sheets in case they could not get the technology to work.

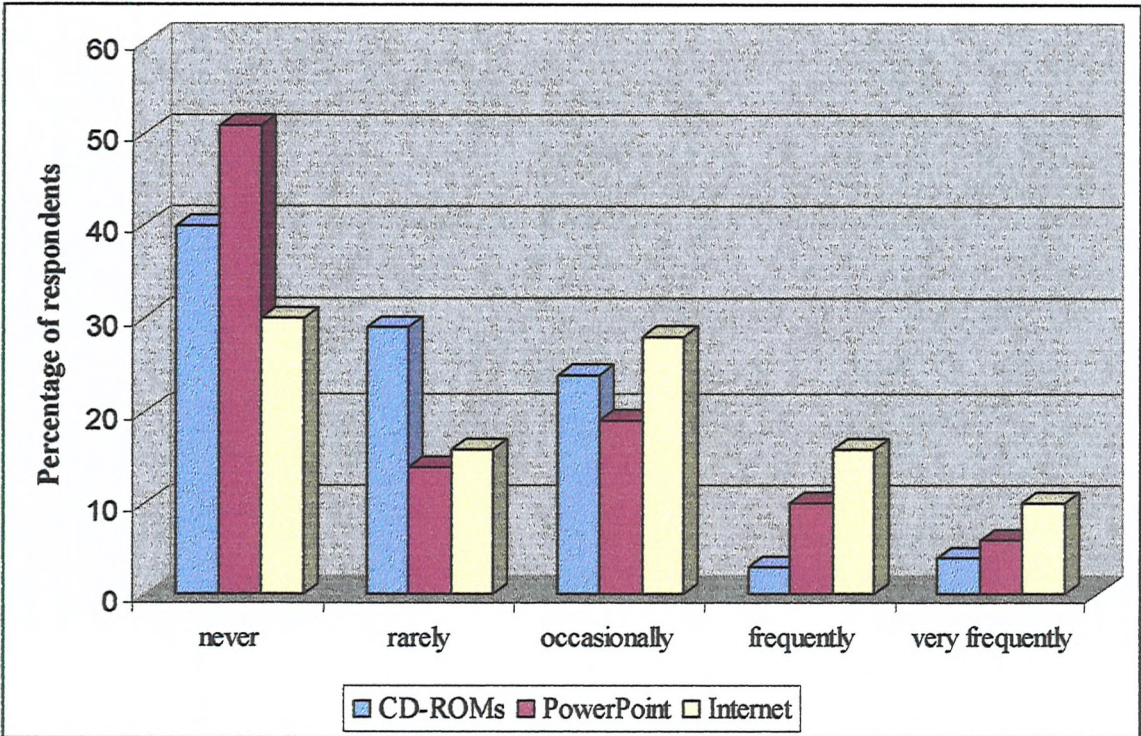


Figure 4: Frequency of ICT use

The use of PowerPoint in the classroom varied considerably. For instance, one of the interview participants used PowerPoint,

“on a very frequent basis. I use PowerPoint to put all of my overheads onto. I use PowerPoint and I print overheads from it just in case there is a problem running PowerPoint. The aim is to have all of my overheads on PowerPoint. The whole thing makes everything look far more professional in my opinion.”

Others used PowerPoint less frequently, or not at all. However, amongst this group there was a common desire to use PowerPoint.

“I have not used PowerPoint yet in the classroom but that is due to the fact that there is little availability of projectors and a networking point. It is going to take a while, the time and commitment to set-up a presentation. I have seen other peoples work (presentations) that are very good and they would be useful to me. I am not sure, hands on how long they would take to set up.”

Access and availability of the equipment, time to prepare the slides and the time required to set-up a projector and laptop in the classroom were all identified as barriers to using PowerPoint. These issues are further discussed in the Management, Access and Barriers section of this chapter.

The Internet

The teachers were asked the frequency of Internet use in the classroom. The responses were never 30% (n=21), rarely 16% (n=11), occasionally 29% (n=20), frequently 16% (n=11) and very frequently 10% (n=7). The departments of Media and Journalism, Computing, Engineering and Design were amongst the most frequent users, which is perhaps not surprising given the use of computers in these vocational areas. Carvin's model of the Internet as a tutor, a publishing house, a forum or a navigator provides a useful framework to evaluate the use of the Internet in the classrooms of the Further Education College. The data showed that there were many ways in which the Internet was used in the classroom. Primarily, the Internet was used as a navigator to access databases, journal articles and biographies, and to access ready-made materials such as the questions that are available on the BBC websites. The case was made that research skills and strategies are required when using Internet, otherwise a lot of time can be wasted. A strength of the Internet, according

to Ayerst (2000, p.2) is that it allows the Internet students to search for information from different sources. One of the questionnaire respondents noted that students could obtain product and company information related to their vocational field and, as such, it was a good way to obtain relevant and up-to-date information. Hulume (1999, p.13) describes the power of the Internet as bringing the outside world into the classroom; the data reflects this position. The Internet was also used as a quick way of linking to official documents.

With the exception of web-design courses, there was no evidence to suggest that the web was being used as a publishing house where students could send information or prepared work. As a forum, the Internet was described as, “a communication medium that students respect, a medium that is useful to the majority of students and one that students enjoy using and prefer to tradition textbooks.”

The participants did acknowledge the limitations of the Internet. It was considered to be too easy and does not facilitate proper research.

“The problem is it leads to students thinking that everything is, or can be obtained on the Internet.”

The Internet was also seen as unreliable and the authenticity of websites should be questioned by students. As one respondent puts it, “there is a lot of rubbish to wade through”. This is in agreement with Carvin’s (1999, p.7) point that the Internet is over-cumbersome and that search engines are often too extensive for educational use.

An advantage of the Internet is that it acts as a discussion forum with e-mail, ‘chat’ and the ability to send text-messages to mobile phones. It is these functions that created the most anxiety for the teachers with improper use of the Internet.

“Students also use chat rooms and PC's are not being used for the intentions for what they are in the college, which is a learning tool and a way to present assignments. I think there needs to be enough ways to give students an interest from material from outside of the college material to actually download certain materials from the Internet but is it really necessary for them to be downloading MP3 (music) files, rotten.com, pornography sites, use of chat rooms and hotmail for any and all reasons other than as a facility for being here to learn and text messaging, of course.”

The interviewee went on to discuss the college Internet use policy that all students were required to sign. He commented on the way that students would often break the regulations. This breach would challenge the teacher's moral and ethical stance as they had to decide what activities and sites they would allow or disallow.

“I would imagine for a tutor that may not be overly confident in being assertive with a group of twelve testosterone driven young men around a computer looking at pornography or looking at sites that they should not be doing.”

Course material on the Internet

Delivering their courses online, or even putting part of their course materials on the Internet was a distant objective for most of the teachers. Only 21% (n=15) of the respondents indicated that they had considered putting their course materials online. Yet 41% (n=29) thought that their course materials were suitable for online delivery.

It was felt that course outlines, notes, handouts and schedules could be put online but, as one of the interview participants indicated, he would not put his scheme of work, or schedule, on the Internet as this restricted his autonomy to change the programme as the course progressed. It was widely acknowledged that whole, or part delivery of courses via the Internet was the way forward.

“Unless we move ahead with technology, we will continue to have large amounts of paper-based resources that aren't ideal.”

One of the respondents indicated that a Virtual Learning Environment (VLE) might be an appropriate direction for the college. A VLE is a tool for delivering and/or supporting distance and flexible learning using Web technologies (BECTA, 2001).

The idea was voiced of pooling expertise and working with others to reduce costs in the production of online materials. Kennewell et al. (2000, p.90), suggest that the introduction of ICT into subject teaching may act as a catalyst for reform by focusing the attention of subject teachers on new pedagogy which challenges traditional subject practices and beliefs. Interview data revealed that other colleges had expressed an interest with this college in developing collaborative online materials.

The need to maintain face-to-face contact with students, particularly for practical courses, was seen as essential. Conversely, the opinion was expressed that a course supported by online materials could maintain interest and enhance student motivation. However, others recognized that the student studying online is working independently and the associated isolation could decrease motivation.

The idea of putting courses online represented a considerable challenge for some of the teachers. One of the teachers stated that, "It would surprise me if it happens in the future. Don't know if I am personally prepared for it". Another acknowledged that, "a huge amount of prior planning/liaison is required."

The modus operandi of the institution was also felt to be a barrier to putting materials online and to the development of online courses. In one case, it was the attitude of his line manager that was the barrier.

One of the participants had put a concerted effort into having his course materials available on the Internet. The issues for him had then become the authorship and updating of the websites and student use of the material that was made available to them.

"There is no one really with good Internet development skills to help us move forward in that area. Then there are all of the other problems of once all of this stuff is on the Internet, who has the authority to upgrade and edit, because a consequence of being on the Internet is that it reaches a wide array of people, so you only want certain people editing it. But by putting on supporting handouts etc. then these once again need to be 'read-only' access because the temptation is there that amongst that whole myriad of handouts students can just cut, copy, paste. I am sure that they can put half a dozen assignment together just on the strength of cut, copy, paste of the lecturers' notes, so that needs to be addressed."

CD-ROMs

The data showed widespread support for the use of CD-ROMs in teaching. However, the questionnaire responses showed little use of CD-ROMs in the classroom. 93% (n=65) indicated that they used CD-ROMs never, rarely or occasionally. CD-ROMs were seen as a useful, flexible medium that can be used to support teaching and give

access to resources that are beyond the material that can be covered in the class time. Some CD-ROMs were also being used for assessment purposes. The interactive nature of CD-ROMs was thought to stimulate interest and to accommodate different learning styles. One of the interview participants had spent a week at another college reviewing IT and its use for students with learning difficulties. She recalled,

“I spent a morning with one tutor in another college. He had different CD-ROMs for the various students to work on. It was fantastic to see the learning that was taking place. The students could work at their own pace. It is so hard to imagine how good it is until you go there and see it in operation.”

CD-ROMs were seen as allowing students to learn at their own level and pace, thus giving them control of their own learning. However, one of the participants felt that setting targets was important when giving students independent work that involved the use of CD-ROMs. Others thought that CD-ROMs should preferably be used outside of the classroom to support the independent work of students and to increase their interest in the subject. It was also noted that the quality of CD-ROMs varies greatly and, in the case of art and design, they were more applicable for manufacturers' use than for students. CD-ROMs were viewed as a valuable resource for students with learning difficulties, such as dyslexia and hearing impairments and to reinforce the learning of the basic or key skills, such as IT, English and Mathematics. Two of the interview participants had viewed, or recently ordered, CD-ROMs with the intention of using them in their classrooms. The reason why CD-ROMs are so popular yet so rarely used is an anomaly that needs further investigation.

Assessment Purposes

The questionnaire asked if the teachers used ICT for assessment purposes; 79% (n=54) responded no and 21% (n=14) yes. Typical comments that illustrate the position for the majority of teachers included, “I know it can be done, but not sure how” and “I do not have enough knowledge to comment”.

In the Motor Vehicle and Key Skills departments, teachers were using Internet or CD-ROM tests that were commercially available and used in most colleges. The Hotel and Catering department had made a concerted effort to integrate IT into the student

experience. All of the Catering students were required to word-process their assignments and the underpinning knowledge, or theoretical aspect, of these courses was delivered in a computer room. These students worked at their own pace from CD-ROMs. The CD-ROMs were also used to test the students.

“It marks it, scores it and they can use it in their portfolio of assessed work. It reduces tutor time in marking the assignment, coming-up with the grades and filling in the necessary statements. It helps the students with the one thing that they do not like which is writing contextual statements by hand when we have the Key Skills program to do that.”

Other IT used

Questions were asked as to what other forms of technology (aside from PowerPoint, CD-ROMs and the Internet) were being used in the classroom. Other types of hardware and software applications were related to the vocational area and no general pattern of other technology use emerged from the data. For example, Apple Macintosh computers were used for media products by the journalism students, the AutoCAD drawing program was used by engineering and design students and spreadsheets were commonplace in science classrooms. Six of the respondents interpreted ‘other’ technology to include the use of videos in classrooms which, with the convergence of computers and film in the DVD format, may become important areas for further investigation in the future.

A digital camera had been used in some of the curriculum areas for taking photographs of students while they were undertaking field trip activities. In the hotel and catering department students were encouraged to take digital photographs of meals that they had prepared. These photographs were compiled into a portfolio of each student’s work and used for assessment purposes.

The college had recently installed two new video conferencing facilities on its campus, but there was no evidence in the data to suggest that teachers were considering the integration of video conferencing into their pedagogy. As one of the managers pointed out,

“The thing about video conferencing is that most staff don't know where to go with it, but it is quite easily something that they could pick-up.”

Electronic whiteboards were another aspect of technology in which the college was investing. Two of the participants had experience of using electronic whiteboards in other institutions. One of the respondents stated that,

“It is just so interactive, it has changed the lessons, it is just brilliant.”

The other respondent expressed an opinion that,

“They are a very, very expensive luxury. Yes, with an electronic whiteboard you can print them out at the end but with students doing their own spidergrams and brain storming as well as tutors doing it on the board, what is the point? Perhaps you can do almost the same with a PowerPoint projection and a white background and just typing the words as they appear. I am not convinced that is a good use of money; it is quite expensive. Ours were always prone to breaking down and it wasn't as if it was from one of the suppliers. The (other institution name) were quite astute and they had three or four different suppliers and they bought them in so that we could play off one machine against another expecting one to operate better than the other. As it were, they were all useless.”

The staff perceptions' of CD-ROMs, the Internet, PowerPoint and 'other technologies' have been identified. The discussion will now focus on the approach that the college had taken to managing the development of ICT.

Managing the Development of ICT (ILT) in a Further Education College Teachers and Managers Perceptions

All of the managers who were interviewed had been involved with some aspects of writing policies and procedures and in committee work related to IT and ICT. The teachers who had not been involved in these activities were not as conversant with IT policies and procedures. One of the participants explained that, “Basically my knowledge of ICT policies and procedures is non-existent.” He did see this as a barrier to using ICT in the classroom. However, another participant considered it essential to have some knowledge of the Data Protection Act and the User Licence Agreements. Other aspects such as knowing which Internet sites were permissible for students to view were felt to be already controlled by the 'firewall' that was installed on the college computers to prevent inappropriate access. It was noted that the

firewall was not always entirely effective and this had caused some embarrassment for students and the supervising teacher when those students were called to account. The college had two main committees for the management of ICT in the college. Further, responsibility for ICT had been delegated to various people at differing hierarchical levels in the organizational structure. This was seen as a source of frustration for some of the teachers.

“The college has far too many committees, don't they. They have committees for committees and people lose track of what does what. It is too transient; people come and go and change and they don't tell you who you should talk to and who you shouldn't. I am not saying they are not valuable, it is the time commitment to go.”

To overcome the problems associated with the changing dynamics of committees and a lack of knowledge of policies and procedures, Chris realized that she could get results,

“Only through moaning. I know who our committee rep is and by talking to (manager's names) with responsibility for IT development when they appear in my classroom.”

During Chris's interview it became clear that she had become very accomplished at moaning to the right people and had managed to get a computer moved into her classroom. Another interviewee noted that,

“I tried to get an Electronic Whiteboard as I felt that it would really, really help the students with their learning. Particularly when you consider the amount of money that these students bring in (to profit the college). I was told by the (appropriate senior manager) to write a report. I think they took notice, but nothing has really happened yet.”

Another manager had expressed concern over the need to consider carefully investments in ICT.

“I am certainly not against new technology, I am an advocate of it. I have seen it happen so many times in Colleges, this is my fifth college, and I have seen new technology implemented too quickly, which is still behind what the private sector has anyway without any real forethought.”

The college had a policy of centralizing its IT resources. A group of technicians formed the Central Computing Function with responsibilities for all aspects of IT

provision in the college apart from the booking of laptops and projectors. A perception of one interview participant was that, while the central computer function was strong in providing mainframe and computer hardware activities, this structure did not support the use of ICT in the classroom.

“I think IT manage their own area very well, but they are very short-sighted and do not see the broader spectrum that in the college things could be available.”

However, another interview participant with experience of working in other colleges was very supportive of the Central Computer Function.

“I have a passion for IT and I think it gets knocked in this college. Having worked in other colleges, it is a little bit annoying to me when I get to meetings and we butcher IT and how it is running in our college. This is by far the best I have ever seen a college working with its IT.”

The participant then went on to describe in detail the differences between this college and others, before concluding that,

“I don't think that the I.T. manager (mentioned by name) really gets enough praise for that. He just gets a hit list every time that man is in a meeting, he does a b****y good job.”

There was widespread support amongst both the managers and the teachers for the use of ICT. The staff development initiatives were viewed as a way to encourage the use of ICT in the classroom.

Staff Development Issues

The question then arises as to what structure a programme of staff development should take in developing ICT in the college. Staff development in the school system is emphasized in the literature as being important for the successful integration of ICT into classroom practices. Lawson and Comber (1999, p.42) point out that in the school system teachers have been relatively slow and resistant to incorporate ICT into their pedagogy and that dropping a computer into a classroom with little training generally does not work.

A manager with responsibilities for ICT and staff development had recognized the diversity of needs that existed in the college.

“I came from a much smaller college, where the staff were much more like-minded. When I came to this college, I had to continually amend my ideas, because there is such a mixture of skill levels here.”

This manager had taken the approach that developing ICT in the classroom was a matter of empowering individual teachers.

“People will only take on ICT and using ICT if they feel comfortable with it. So what we have to do is to persuade people that it is a worthwhile thing to invest time and effort into because it will have rewards in the future; this is not just for the college, but for the individual staff themselves.”

Three strategies had been adopted to develop the ICT capabilities of the teachers. These were single skill development sessions, an ICT for Teachers’ course and the appointment of two part-time ILT Champions who could assist with classroom activities.

The interviewees criticised the single-session development sessions as being ineffective. Fullan (1991, p.316) also criticises such an approach, noting that most professional development fails because of a profound lack of conceptual planning and the inability to address the individuals needs and concerns. The interviewees demonstrated their support for the ICT for Teachers’ course although there were issues of commitment and time requirements.

The first ICT for Teachers course was currently being delivered as a one year course and required attendance for three hours per week. The interview participants included teachers and managers who were both the instructors and candidates for the ICT for Teachers Course. One of the participants outlined how the course had been effective in giving her the confidence to use ICT in the classroom.

“Having completed portfolio.. (pause).. I am much more confident in my own skills. You can see that I was very negative to begin with. I am now much more positive to using it in the classroom. I was more negative in the past because I doubted that I had the skills, but when you actually get there with students you realize that they do not have the skills that you do. There might be one or two, but the rest are fine. I went in to teach a group of GNVQ

students who had taken a year of IT courses and within a couple of weeks I realized that I knew more than them.”

This participant went on to describe how she felt inferior at home to her childrens’ and her husband’s confidence in using computers. Having taken the ICT for Teachers course and having used computers with students, she now felt that she was on equal terms with her family with respect to computers. Similarly, Lawson and Comber’s (1999, p.46) survey of 51 schools and colleges found many examples of technophobes who had been converted to computers through exposure to ICT.

The required time commitment to the ICT for Teachers’ course was proving to be a considerable burden for those attending the course and a reason why other interviewees had not applied to take the course.

“One-off drop-in sessions on how to use a computer application are so intense that you often forget what you have learned. The fact that you can go every week to a professional development course and have it (the learning) reinforced is better, but again a twelve month course is a long commitment. We should do it in twelve weekly sessions.”

The teachers and managers who were responsible for the ICT for Teachers course had come to recognize the sequence of skill development that is required to use ICT in the classroom. In consideration of the next ICT for Teachers course to be offered one of the managers stated that,

“what we have decided to do is to offer the ICT for Teachers course as two programmes that are offered in two stages. For those people who have got the skills and just want to increase their confidence in using a computer with students that would be the second part of a two-part programme. With funding, if we get the funding then we are proposing to run both of them in September.”

For a teacher with few computer skills, what the manager was recommending was a three term programme. The first term would be spent learning the basics, the second term improving their skills and the third term learning how to implement those skills in the classroom.

A further issue concerned the priority and status that was attributed to the course.

“You attend this, but you are also expected to attend other meetings, and it is something that needs to be thought about with the line manager. So that during the first twelve weeks you should not be expected to go off and do other things.”

Maddin (1997, p.56) suggests that a course for teachers in the use of ICT should be followed by a maintenance system that encourages continuing development of skills beyond the completion of a course.

For Fullan (2001, p.97) real changes in instructional practice involve working through problems of practice with peers and experts, observation of practice, and steady accumulation over time of new practices anchored in one's own classroom setting. The ICT for Teachers course gave participants the opportunity for personal reflection on the use of ICT in the classroom. Further, the course instructors conducted observations of members using ICT in their classrooms.

Barriers

The data suggests that there were significant barriers to using ICT in the classroom. One of the interview participants summarized the position in stating that the lack of, “time and technical support are the main issues, but also availability.” This comment refers to the amount of time required to prepare a presentation using PowerPoint and to set-up the equipment in the classroom. Technical support, in this case, refers to the lack of a technician to support the use of ICT in the classroom. Lack of availability related to problems that she experienced in being able to book a laptop and projector.

The college held 12 laptops and projectors in a central office on the main college campus. In order to make a presentation a teacher would have to book, collect and return the equipment to the central office. This arrangement emerged as a significant factor and was sufficient to deter some of the interview participants from using ICT in the classroom.

“Well I think they get a bit annoyed with all of the staff development that is offered on using PowerPoint, for instance, with no real facility to use it here at the college.”

“We have about 12 laptops which are held in (the central office) and that is a hell of a distance to go from here over to (the central office) to set up a PC for an hour and a half slot when the timetables don't even allow for time for movement between classes.”

Other teachers described this process as “a bit of a hassle” and “would have preferred to have them in the departments.” The imbalance between the level of training and the access to the equipment was also noted by other interview participants.

“Well I think they get annoyed (referring to staff in his department) with all of the staff development that is offered using PowerPoint, for instance, with no real facility to use it here in the college...I just feel that there is a lot of effort towards IIP, (Investors In People) for instance, where people are given the opportunity to develop their skills in certain software applications without the means to support their use after the course.”

The time taken for a technician to respond was felt to be crucial. Support was evident for a ‘help desk’ where teachers could phone from a computer room to have assistance, for instance, with getting a student logged-in to the computer network. However, time delays in a situation such as experiencing problems with setting-up a PowerPoint presentation was explained as a source of frustration. A solution, suggested by an interviewee, would be to have technicians assigned to individual departments.

Access issues were not just restricted to projectors and laptops, but also to the number of computers in teachers’ offices, or workspaces, and the number of computer rooms that were available for class use. The sharing of computers in teachers’ workrooms was identified as a barrier by a participant who argued that there was a low ratio of computers to teachers.

“the managers may have a computer to themselves, I have myself, personally speaking but I know that for my colleagues in one office it is 1:5. In actual fact it is 1:5 in two of the offices that I am thinking of at the moment. So I mean, what is the point in staff doing PowerPoint if they can't prepare it on their own PC, let alone having a laptop and projector in another classroom.”

While a lack of computer resource was indicated in some areas, one of the interviewees described in detail how a computer had been put in a room next to a workshop area so that students could find information on CD-ROMs to support their learning. However, the computer had been tucked away in a corner and the students

and staff did not know the password to get access to the software. Therefore, this computer was only being used for word-processing and not for the purpose for which it was intended.

One of the interviewees had special responsibilities for students with learning difficulties and disabilities (LD&D). She indicated that computers could significantly enhance the learning activities of these students. The competition for computer rooms meant that she was getting approximately half of the time that she desired in a computer room and what she really needed was specialist, adapted technology. This teacher commented that,

“If they are serious about ILT in the college then it needs this kind of investment.”

Finding an available computer room, having the keys to access the room and students forgetting their passwords to the network were common difficulties that created differing degrees of anxiety amongst the teachers. In the computing department this was much less of an issue than for teachers who only wanted to use a computer room on an occasional basis. Two of the interviewees noted that they would have used computers with students more frequently had the rooms been available.

The data suggests that difficulties associated with access to computers for use both in and out of the classroom situation may be a source of stress and consequently impact on the job satisfaction of teachers.

“After six months, you have forgotten that you could only find 10 machines in one room to do a piece of work.”

The discussion will now address the evidence pertaining to the skills and levels of confidence that teachers require before they are comfortable to use ICT in the classroom.

Confidence and skill requirements for the use of ICT

60% (n=42) of the sample described themselves as proficient in using computers, yet only 31% (n=22) described themselves as proficient in using computers in the

classroom. Similarly 49% (n=34) described themselves as non-confident, or lacking in confidence in using computers in teaching as compared with 30% (n=21) who were not confident about their personal skill level.

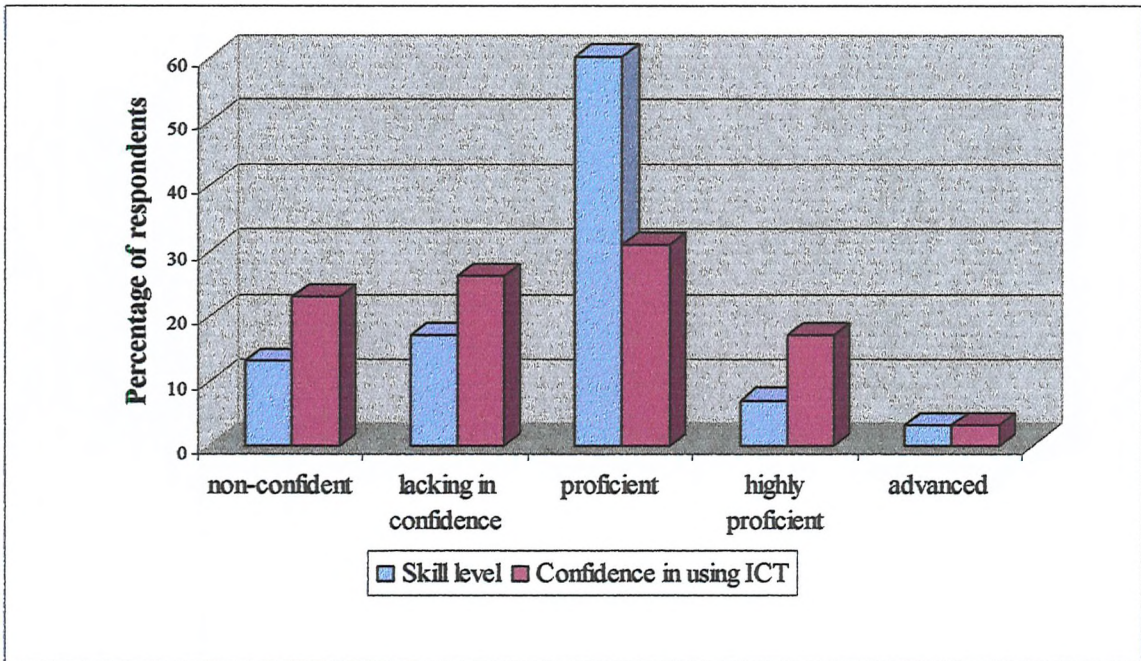


Figure 5: Personal skill level and confidence in using ICT in the classroom

An emerging theme arising from the data is that support in using IT is essential in building confidence. An example of this is given by another participant who recalled an occasion where she had booked a room to use the Internet with students and requested the support of a manager who had considerable experience in this area. The session did not take place, which she felt was, “probably just as well as I am not confident with it anyway.” The session was re-booked and she expressed positive feelings about the eventual outcome.

The idea of using teachers with experience of using ICT in the classroom to support less confident teachers was reflected in the ‘ILT Champions’ scheme. Unfortunately the ILT Champions scheme was still in its infancy and as one of the participants noted the aims of the scheme and the role of the champions had not yet been clearly communicated.

The data suggests that being able to use a PowerPoint presentation that has been prepared by others is becoming an important skill in classroom teaching.

“In my opinion, teachers should not be deterred from using IT in the classroom by insisting that they prepare their own PowerPoint presentation. However, it is desirable that they should know how it is done.”

The ability to edit a PowerPoint presentation, to understand how the program is put together, to understand the transition between slides, and how to hide slides, were further basic skills that were considered to be worthwhile knowing before using PowerPoint in the classroom. Another interviewee described occasions where he had collected a laptop and projector from the central office and default settings had been changed, leads were missing or equipment had been put away in the wrong order. He felt that some knowledge of how to troubleshoot these problems could relieve much potential anxiety in the classroom.

One of the participants acknowledged that using CD-ROMs in teaching required few skills other than knowing how to put a CD into the computer and ‘point-and-click’. In contrast to the notion that using computers in the classroom is simply a matter of ‘pointing and clicking’, one of the participants, Heidi, stated that, “you should be competent in all areas”. A follow-up interview question probed further to ask:

“To summarize, you said that you were not confident in using ICT in the classroom, yet you use e-mail, the Internet and computers for Word Processing. What would be the next step in order to build your confidence in using ICT in the classroom?”

Heidi responded,

“PowerPoint, and the reason is because we have never been given the opportunity to do staff training on that. After a few sessions I would be fine; it is just the confidence to actually use it. So I think that staff training is absolutely essential but it is not always available.”

The fear of not knowing what to do when a student makes a mistake and carries that mistake forward in a computer application was suggested as one of the reasons why teachers may be reluctant to use computers in their classroom. An interviewee explained that it is desirable to have some knowledge of software troubleshooting but that with technician support it is not essential. Knowledge of the default setting was

also thought to be desirable as this was something that could be altered by students and frequently caused problems.

The results do not concur with Lawson and Comber's (1999, p.42) suggestion that teachers themselves are perhaps the main limitation to the use of ICT in the classroom. The Further Education teachers felt that other barriers, such as a lack of time and access to equipment and attitudes of managers were more significant amongst a group of teachers who expressed a strong desire to use ICT in their practice. However, Lawson and Comber's (1999, p.42) findings that teachers in the school sector have been relatively slow to incorporate ICT into their pedagogy is supported by this study which was located in a Further Education institution. More research is needed to confirm that this is the situation across the Further Education sector.

The data suggests that possessing skills and confidence in using ICT in the classroom can enhance the job satisfaction of teachers.

Job Satisfaction

Job satisfaction was a term that I applied to a complete section of the data that could not be coded to any of the existing nodes. This section of data reflected this single theme of job satisfaction. For a minority of the Further Education teachers job satisfaction, in a positive sense, had been acquired through the successful integration of ICT into their classroom practice. The umbrella term of job satisfaction also captured, in a negative sense, the anxiety and frustration expressed by the majority of Further Education teachers in not being able to use ICT when they had a desire to do so.

Job satisfaction in teaching is, according to Fullan (1991, p.24), derived from student achievement and being able to deliver quality learning experiences with a sound pedagogical framework. The barriers to ICT, therefore, were preventing the Further Education teachers from delivering some of the quality learning experiences that they

may have wanted to pursue and this had impacted on their job satisfaction. This point was reflected by one of the interview participants who stated that,

“I think that all staff feel letdown when students don’t achieve. It is the nature of the job. If we can find ways of helping staff to keep students on their courses then it is also about the job satisfaction for individual members of staff.”

Kasworm (1997, p.7) cites the historical work of Rogers (1995), who graded technology users as ‘innovators’, ‘early adopters’, ‘early majority’, ‘later majority’, and ‘laggards’. Innovators are the forerunners who are likely to have taught themselves and can offer advice to newcomers. The teachers who took the first ICT for Teachers’ course are good examples of early adopters who may be some of the first to use ICT in the classroom, but approached the task via a recognised route. The early and late majority perhaps represented the majority of teachers in this study, given the low levels of ICT use across the college. The point in time at which the early and late majority use ICT in the classroom is the most predictable. Laggards choose to isolate themselves from using ICT in the classroom. In this research one such respondent was close to retiring. He used e-mail because all of the staff had e-mail accounts, but he did not use IT for any other purpose and had no intention in using it in the classroom.

Differing anxiety-responses were noted when the teachers were considered in terms of where they would be located on the innovators, early adopters, early majority, later majority or laggards continuum. Innovators expressed anxiety with the policies, procedures and the availability of resources. Early adopters, defined in the context of this study as those taking the ICT for Teachers’ course expressed most concern about the lack of available time to develop their skills and resources. These concerns were also expressed by the majority, although lack of knowledge about how ICT could be used in the classroom was also a concern.

Fullan (2001, p.1) points out that change is a double-edged sword. On the one side there can be fear, anxiety, loss, danger and panic; on the other, exhilaration, risk-taking excitement, improvements, energizing. Change, therefore arouses emotions. There was little evidence to suggest that management of the Further Education

College had recognized that implementing ICT, or failing to implement ICT, in the college requires change and could, therefore, create anxieties amongst the Further Education Teachers.

Brian, a manager and innovator, outlined how he had been awarded a grant from the Further Education Development Agency (FEDA) to purchase fourteen CD-ROMs for use in class. He expressed frustration at the steps he had to take to get the computers upgraded to take the CD-ROMs. His frustration grew when the computer room with the upgraded machines was subsequently demolished and the equipment in the room was moved across the campus. Other concerns for innovators and early adopters included not being able to access college files from their home PC's and the non-compatibility of software operating systems between the college and home PC's. Specifically, the college was operating on Windows NT and Office 2000 while many of the students had Windows XP at home.

One of the interviewees described a situation where she felt a sense of pride in having persuaded her line manager to have a computer upgraded and moved into her classroom. This computer had subsequently been used by students in her class to plot graphs from data that was derived from earlier in the lesson.

Another interviewee recounted how he had learned to use the 'hot potatoes' website to make up quizzes and gapped-handouts. He went on to describe how this had brought a fun element into his classroom practice that was enjoyed by both the teacher and his students.

A further description was given by a teacher of computer software that had been purchased to support visually impaired students. The software had been demonstrated at an open day and consequently five new students had enrolled on her course. Ownership of this initiative had given her a sense of satisfaction in knowing that the students and the college had benefited from her initiative. Other interviewees also felt that ICT could be a significant factor in retaining students and encouraging them to achieve.

These examples illustrate how the successful implementation of ICT into classroom practices could enhance job satisfaction, and how barriers and inappropriate decisions to innovations could create tensions and negatively impact on job satisfaction.

CHAPTER FIVE

Conclusion

This investigation aimed to determine teachers' perceptions in using ICT in the classroom. In-depth interviews were conducted, and a questionnaire was distributed to teachers in a Further Education College on the south coast of England. The case has been made by Davitt (2001, p.64), that a political agenda has led to large sums of money being invested to put computer technology in schools and further education colleges without research and proper consideration for its implementation. This lack of consideration for pedagogical purpose is supported by the data in this study.

Lewis (1999, p.10) argued that the voices of teachers need to be heard and that key questions about teachers' feelings and the level of support from their institutions needed to be addressed. The emphasis of this study on qualitative approaches means that the deficit in the literature about the concerns of teachers in Further Education about introducing ICT into their classrooms can begin to be addressed.

This chapter examines the limitations of the study, emerging trends, the implications of the findings in terms of the aspirations for ICT use in classrooms, pathways towards constructivist learning, and implications for further research. Finally it considers what recommendations can be made for the integration of ICT into classroom practices.

Limitations of the research

A mixed-method, or dualist approach that combined the qualitative and quantitative paradigms was selected for this research. As previously indicated in the literature review, all research methods have their limitations. Walker (1985) argues that,

Qualitative methods are subjective, unreliable, unsystematic, lack adequate checks of their validity and are generally unscientific. Quantitative methods, it is counter-argued are technically inadequate in the face of real problems, usually inappropriately used and fail to explain most of the variance they do reveal. (Walker, 1985, p.88)

The claim by Walker (1985) that qualitative methods are subjective was countered in this study by a systematic approach to data collection and analysis, and by member checks and with the triangulation of the data. The process of data and methodological triangulation allowed for the corroboration of evidence and improved internal validity. The qualitative methods helped to explain the variance found in the quantitative data. In essence, the mixed-paradigm approach allowed for the weakness in one method to be offset by the inherent strengths of the other. Despite these controls for validity and reliability, it is still recognized that the study involved the perceptions of the researcher reflecting on the subjective perceptions of the participants. The thoughts, feelings and emotions of the participants are self-reported. Attempting to understand perceptions of change processes is also problematic. Understanding the true motives for a teacher using ICT in a classroom may not be entirely possible. Fullan (1991, p.28) argues that teachers sometimes innovate for symbolic political or personal reasons. These may include an attempt to appease community pressure, to appear innovative or as an attempt to gain more resources. These forms of change may represent symbolic rather than real change.

The questionnaire asked about the frequency of Internet use in the classroom. Although the figures for Internet use are low, it is surprising that the Internet use is higher than PowerPoint use in the classroom. It has been shown that there was a strong desire to use PowerPoint and that PowerPoint may not be so challenging to a teacher's pedagogical ideology. It is possible that teachers may have approached this question about Internet use with differing perceptions. The questionnaire asked the respondent to reflect on the use of ICT in the classroom. However, the teachers may have viewed this question as about Internet use in all of their professional practice. Another possibility is that as all students in the college were required to use the Internet as part of the key skills programme, all courses had an element of IT.

Therefore, the teachers may have considered the use of the Internet as part of their courses rather than in each individual teacher's classroom practice.

Within the limits of an EdD thesis it was not possible to cover all potentially relevant variables like gender differences in the use of ICT. The study did capture the issues for a teacher who was coming up to retirement, and these were different from those teachers who were pursuing a career more actively. The situation in Further Education is somewhat different from schools in that the new recruits are generally from industry with a number of years of experience and are not a homogenous group of university graduates. The college had recently offered a programme of early retirements and as there were not many young recruits on the staff, the age range was not considered to be diverse. This study, therefore, did not look at other differences in age groups for the questionnaire sample, but considered this only if it was a factor for the interviewees.

Emerging Patterns

The aim of this study was to discover the Further Education teachers' perceptions as they either rejected ICT or attempted to integrate it into their classroom practices with varying degrees of commitment, application and success. Three key questions were addressed in consideration of the overall aim. First, the question was asked, how do teachers use ICT in the classroom? Secondly, what is their understanding of the potential for ICT in the classroom? Thirdly, which management strategies create a meaningful structure for implementing ICT in the classroom? The emerging patterns, discussed below, highlight issues that are worthy of consideration in policy development.

The overall pattern that emerges is one where the teachers felt positive about using ICT, and the management of the college has made concerted efforts to increase the incidence of ICT use in the classroom. Kennewell et al., (2000, p.89) note that the challenge of using ICT in teaching is not a minor innovation, the co-opting of a new

technique, but rather a root-and-branch change in teaching style. Further, what is an effective ICT activity for one teacher may be ineffective for another.

The data suggests that the Further Education teachers considered using PowerPoint in the classroom as the first step in introducing ICT. PowerPoint was welcomed because it can be rehearsed before being used in the classroom and the teacher retains control of the learning situation. Allowing students to have independent use of computers in the classroom is the second step.

PowerPoint, CD-ROMs, the Internet and the video conferencing facilities were infrequently used by the majority of teachers. Roger's (1995) model of teachers as 'innovators', 'early adopters', 'early majority', 'later majority', and 'laggards' provides a framework for understanding the different points at which a teacher will engage in the lifecycle of a new technology. I did not set out to classify the interviewees according to Roger's (1995) categories. However, on reflecting on the interview data, the teachers did appear to fall naturally into the Roger's (1995) categories. Further research may wish to integrate the Roger's (1995) model into the methodology by asking the teachers to self-select a category appropriate to their own familiarity with the technology.

By classifying the interviewees according to Roger's (1995) framework, I felt that it was possible to gain an understanding of the different anxieties that confront teachers at varying levels of IT capability. Early innovators, for instance were confronted by issues such as the authorship of web-pages and how to access work files at home. The majority of teachers, however, had not considered putting course materials on the Internet and therefore were not confronted by these issues. The barriers of a lack of time to train and prepare ICT materials and difficulties with access to equipment were the most significant issues for the early adopters and the majority of teachers. Other barriers included a lack of technician support and the centralization of resources.

One of the implications of this study is that the introduction of ICT in the college created anxiety for the teachers. Those who had made changes and who were now

using ICT identified new stressors that they now confronted and those teachers who wanted to use ICT but could not, also expressed anxiety and the barriers that confronted them.

These findings have many similarities to the study by Williams et al. (2000, p.307) who investigated ICT skills and the knowledge needs of teachers working in primary and secondary schools in Scotland. In the Williams et al. (2000) study, questionnaires from 52 primary and 329 secondary schools were completed and returned. This represented a response rate of 18% and 37% for the primary and secondary school respectively. While this was a low response rate, Williams et al. (2000, p.308) indicate that they were able to capture a broad cross-section of teachers from within the participating schools.

Linking the findings from the Williams et al. (2000) and my study suggests that many of the perceptions of the use of ICT in the classroom for teachers in primary and secondary schools are similar for teachers in Further Education. Specifically, the similarities include:

- A strong desire to use ICT in the classroom.
- Perception by the majority of competency with computers but not with the use of them in classrooms.
- Internet use in the classroom is relatively low.
- Perception by the majority that ICT has positive benefits in the classroom.
- Introduction of ICT into teachers' classroom practices is at an early stage.
- Barriers to using ICT in the classroom include access to equipment, lack of support and a lack of knowledge or skills.
- More knowledge about how ICT can be used in the classroom is required by the teachers.

There are also differences between the two studies. A lack of support in the classroom was highlighted as a factor in both studies; however, a stronger emphasis on the lack of support was indicated in this study. Teachers in the Williams et al.

(2000, p.307) study were more likely to seek support from other teachers and the school librarian. However, in this study the idea was voiced of the collaborative development of ICT within departments and between colleges. This research also indicated a lack of time to develop skills as the most significant barrier to the use of ICT in the classroom, a point not reflected in the Williams et al. (2000, p.307) study. Teachers in both studies praised training that was offered in ICT, but the data from this study suggests that the teachers were not supportive of the single training session format.

Similar results are also reported by Kennewell et al. (2000, p.96), on the ITCD project that gave an attitude questionnaire to a sample of 289 teachers in 12 Welsh secondary schools. A factor analysis of the questionnaire data revealed six main factors which, in order of importance were:

1. worries about their professional competence with computers
 2. the efficiency of teaching with computers
 3. the quality of learning achieved when using computers
 4. computers and professionalism
 5. enjoyment
 6. the impact of computers on presentations
- (Kennewell et. al., 2000, p.96)

Worries about professional competence were addressed in this study, as was confidence in using ICT in the classroom. This study found that teachers are also fearful of not knowing how to fix a problem that a student may have with a computer. There was no data to suggest that a reason for using ICT in the classroom was to improve efficiency. The improved quality of student work was a justification in areas such as Hotel and Catering where all students were required to use computers. However, there was no suggestion that ICT could improve the speed of learning. Neither did the data suggest that computers in the classroom were overrated, as suggested in the Kennewell et al. (2000, p.41) study. This may be a reflection of the fact that further education colleges predominately aim to provide training for vocations where computers are ubiquitous. Professionalism, the fourth factor in the list by Kennewell et al. (2000, p.41) was reflected in this study with the strong desire to use computers in the classroom. The enjoyment that teachers and students get from

using ICT is also reflected in this study. The section on PowerPoint in this chapter reinforces the position in the Kennewell et al. (2000, p.41) study that ICT enhances the quality of presentations.

A study by Lawson and Comber (1999, p.41) identified four personnel factors that are important in developing an ICT school. These include teachers' attitude prior to innovation, the role of the ICT coordinator, the attitude of senior management and the existence of adequate support and training. This study did not adopt the same variable titles, and these titles reflect the organization structures that exist in school. However, the studies coincide on the following points:

1. The attitude of managers to the introduction of ICT.
2. The roles of coordinators and those providing training.
3. Teachers' attitudes.
4. The need for support and training

Implications of the Findings for Teaching with ICT: pathways towards constructivist Learning

The balance of argument between objectivist and constructivist learning was discussed at length in Chapter Two and the argument advanced there that the constructivist approach to learning through the use of ICT is the most beneficial for learners. The methodology chosen for this study did not explore this approach to learning. Though mixed-method, it was primarily an objectivist approach and the findings, not surprisingly, reflect the nature of the methodology chosen. So there remains a gap between the findings of this study and the aspirations noted for a constructivist approach outlined in chapter 2. In this penultimate section of the study therefore, I wish to explore how such a gap might begin to be bridged for the use of ICT in Further Education classrooms.

As intimated above there was little evidence from the data to suggest that the teachers were using ICT in a constructivist way. It was apparent that the prevailing philosophy

of the Further Education College was about achieving learning outcomes within demanding time limits. Indeed, the data shows that the teachers were using PowerPoint in a way that was consistent with objectivist learning. Characteristically, these teachers would retain control of the content, pace and structure of the learning. Whereas with a constructivist approach the teacher would assume the role of a facilitator, encouraging the students to construct their own meaning from the learning process.

In order to foster such an approach and the creativity it engenders, the culture of Further Education Colleges may have to change. Changing the culture to allow more constructivist learning might appear to be counter to the prevailing environment of prescribed learning objectives and outcomes, which are often to be achieved in the shortest possible time frame.

In order to move towards a culture that values and promotes constructivist learning, a number of changes will be required. First teachers will need to be persuaded to relinquish some of their control over teaching by perhaps allowing students to construct and present their own PowerPoint presentations.

Secondly teachers will need to acquire a higher level of technological skill and more confidence in the use of the technology for teaching and inspiring learning. Thirdly there needs to be a willingness to give students more autonomy and to allow creative exploration within a given framework. This may be difficult to accomplish as teachers may be faced with a situation where students are more familiar with the technology than the teacher. In this case, the teacher needs to be able to take advantage of the students' knowledge and build it into classroom learning.

However, the pathway from objectivist to constructivist learning is strewn with difficulties, many of which concern the management of the college courses. Extra management input will be required to create greater opportunities and to provide facilities for the use of ICT in the classroom. There are, therefore, issues of capital cost and of maintenance as well as the cost of training courses for managers and

teachers. Constructivist teaching, for example, will require a computer per student and may require students to have computers at home, whereas the traditional teacher will only require one computer in a classroom.

The pathway from objectivism to constructivism involves building all the above considerations simultaneously. Management needs to realize that the interplay of these factors is important, as is the importance of supporting the teachers in order to bring about such a change.

Recommendations for the integration of ICT into classroom practices in Further Education

The low use of ICT found in this study suggests that more needs to be done to familiarise teachers with the range of possibilities for using ICT. Working collaboratively particularly within departments was suggested as a route to this end. This study found that ICT use (PowerPoint, CD-ROMs, Internet and 'other') was relatively low. Individual, 'innovators', often chosen as ILT champions to share expertise with others, had used technology such as electronic whiteboards, put course materials online, converted class materials to PowerPoint and assessed students with CD-ROMs and online Internet sources, but the majority had not experimented with these forms. The ILT Champions were drawn from the pool of innovators to share their experience with other teachers.

The finding that the majority of teachers in this study expressed confidence in using computers but not enough to use them in their teaching has implications for staff development and training, as some of this anxiety stems from a lack of understanding as to how technology can be used in the classroom.

The anxiety associated with feeling vulnerable at not being able to help students who are stuck with a computer problem or who know more about computers than the teacher could be addressed by involving students more in the teaching. A first stage would be involving students in giving their own power point presentation. A second

stage would be to relinquish control of the learning situation and allow students to learn from the Internet.

The widespread support the teachers indicated for the use of Power point was thwarted by a range of barriers such as access to equipment, a lack of support and a lack of time, all of which prevented them from using PowerPoint. What is needed to redress and overcome these barriers is time to learn how the technology works, to learn how to troubleshoot problems and to transform material and ideas held on paper or as Information Technology into a learning technology. The centralization of resources and technicians in the college did not facilitate such development and ways need to be found to improve access such as technicians in the departments who could provide timely assistance devoid of jargon and obfuscation.

The observation by teachers in this study that it was not unwillingness on their part to use ICT in the classroom that led to low use, but rather institutional factors, such as lack of access to equipment, lack of technical support and lack of time. These barriers to development of ICT in their teaching could be met through training spread over an academic year.

However, policies, procedures and initiatives such as the 'ILT Champions' and the ICT for Teachers' course cannot transmogrify traditional classroom approaches into ICT capable classrooms built on constructivist principles. ICT use requires fundamental changes in ideological and pedagogical belief systems and this takes much longer to permeate an institution.

In summary it is clear is from this research that a number of developments need to take place if ICT is to be fully implemented in Further Education classrooms to improve teaching and learning. This low use of ICT was not related to a resistance to change; conversely the data suggests that the Further Education teachers had a strong desire to use ICT. The barriers to using ICT are, therefore, very significant particularly as the management of this Further Education College were supportive of the use of ICT in the classroom. To overcome the lack of knowledge or skills, and the

associated lack in confidence, training courses that are longer in duration and offer the opportunity for reflective and collaborative work were considered to be most appropriate. Further research may make it possible to establish if this situation prevails in the other Further Education institutions.

Implications for Further Research

Comparative studies that test the findings of this study against similar institutions may give a broader picture of the situation in Further Education. Consideration needs to be given to external validity or to the extent to which the findings of this study can be applied to a broader population of Further Education colleges. In many respects other colleges might be facing similar problems as they, too, were operating under the same directives of the Further Education Funding Council (FEFC). ICT initiatives, as indicated by the participants, were also consistent with those found in other colleges. However, policies, procedures, management structures and personality types are unique to this institution. The findings, therefore, need to be considered with regard to the uniqueness of the situation. The perceptions of teachers on the use of ICT in the classroom help to provide a picture that can guide future policy decision-making in this college and beyond.

Additional studies in Further Education will also help to address a gap in the literature that has predominately considered the situation for school teachers. The analysis and discussion of the Williams et al. (200, p.307) study of ICT in primary and secondary schools revealed many similarities to this study that are worthy of further investigation. For example, there is a common desire to use ICT in the classroom and there are common barriers to its adoption.

It was noted in the literature (Fullan, 2000, p.97) and by one of the college managers that the development of ICT is a slow process that involves the empowerment and support of individual teachers in the classroom setting. Longitudinal studies could, therefore, reveal the impact of these initiatives or changes in perceptions as they occurred over an extended period of time.

The use of web-based surveys was considered to be inappropriate to this research because it focused on a single institution. The technical difficulties and time taken to develop an effective online survey have been discussed. The response rate was so poor that strategies such as sending out reminders were not considered worthwhile, particularly where a paper-based version could be easily and inexpensively distributed. However, as suggested by Schmidt (1997, p.274) the web-based survey may be an appropriate research tool with an online discussion group. In Internet discussion forums, large numbers of people can be accessed with respect to a very narrow topic. In reflecting on this process it is possible to suggest that this is an inexpensive method where large quantities of data can be directly entered into a computer. Time needs to be invested in developing the online questionnaire, but there may also be significant time savings in the transcription of data. The technology allows pictures, sounds, colours, fonts and even video to be included as part of the questionnaire. As pointed out, further studies are needed on the efficacy of online questionnaires as a research tool.

Finally it may be important to conduct a research project to measure constructivist approaches to the use of ICT. Such a study would probably need to ascertain that teachers had already begun to move towards a constructivist approach to their teaching. Appropriate research questions could then focus on their students' experience of self-directed learning through ICT.



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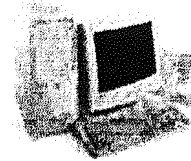
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Appendix i - Questionnaire

(Address removed for publication)



Dear Colleague,

I am currently studying for an EdD (Doctorate in Education) with the University of Southampton. My thesis is focusing on teachers' perceptions of using ICT in the classroom. I am kindly requesting that you to fill out the attached questionnaire as I have drawn your name as part of a representative sample of this college.

Is the questionnaire confidential?

Yes. Your answers will be treated in confidence and will not be shown to any other person or member of staff. You will not be identified in any publication of this questionnaire. Permission has been given to undertake this study and the raw data will be kept in a secure location away from the college premises.

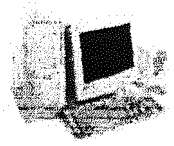
Thank you for completing this questionnaire at this busy time of year. Your participation in this research is paramount to its full completion. This questionnaire will be followed by interviews with members of staff from across the college. If you are interested in participating in this process then please let me know.

When you have completed the questionnaire, please place it in an internal envelope and send it to: Antony Card, 'W' Block.

If you have any other comments or questions then please direct these to: antonymcard@hotmail.com or (address removed for publication of this thesis).

Thank you,

Antony Card



Questionnaire

What is the questionnaire about?

The questionnaire aims to find out your views on the implementation of Information and Computer technology in the classroom. It is aimed at lecturers and teachers in Further Education.

Is it confidential?

Yes. Your answers will be treated in confidence and you will not be identified in any publication of this questionnaire.

1. Please indicate your subject area:

Business Management	Languages and Curriculum Development	
Building and Construction	Media and Journalism	
Computing and IT	Motor Vehicle	
Engineering	Occupational Health and Safety	
Hair and Beauty	Sport, Travel and Tourism	
Health and Social Care	Other	
Hotel and Catering		

2. Please indicate whether you are: Management Lecturing Staff

3. Do you think that your subject area can be effectively taught through the use of ICT?

Yes No

If yes, how could this be achieved?

Comment:

4. How would you describe your skill level in using computers and software packages? (such as e-mail, word-processing, databases, spreadsheets and PowerPoint)

Non-confident	(e.g. difficulty with e-mail, word processing)	
Lacking in confidence	(e.g. confident only with simple tasks)	
Proficient	(e.g. able to use some computer software)	
Highly Proficient	(e.g. confident in using most software packages)	
Advanced	(e.g. configure networks, demonstrate ICT)	

5. How confident are you at using computers in the classroom?

Non-confident	(e.g. unhappy to use ICT even with assistance)	
Lacking in confidence	(e.g. happy to use ICT but with much support)	
Proficient	(e.g. confident with ICT with some support)	
Highly Proficient	(e.g. confident with ICT with limited support)	
Advanced	(e.g. assist others with using multi-media)	

6. How often do you use CD-ROMs in your teaching?

Never	(e.g. not at all)	
Rarely	(e.g. on average once or twice per term)	
Occasionally	(e.g. on average once or twice per month)	
Frequently	(e.g. on average several times per month)	
Very Frequently	(e.g. on average several times per week)	

7. How do you think CD-ROMs can you used to enhance teaching and learning?

Comment:

8. How often do you use PowerPoint in your teaching?

Never	(e.g. not at all)	
Rarely	(e.g. on average once or twice per term)	
Occasionally	(e.g. on average once or twice per month)	
Frequently	(e.g. on average several times per month)	
Very Frequently	(e.g. on average several times per week)	

9. How do you think PowerPoint can be used to enhance teaching and learning?

Comment:

10. How often do you use the Internet in your teaching?

Never	(e.g. not at all)	
Rarely	(e.g. on average once or twice per term)	
Occasionally	(e.g. on average once or twice per month)	
Frequently	(e.g. on average several times per month)	
Very Frequently	(e.g. on average several times per week)	

11. How do you think the use of the Internet can be used to enhance teaching and learning?

Comment:

12. Are there any other forms of information technology which you use in the classroom?

Comment:

13. How do you think different styles of learning styles and age ranges can be accommodated using ICT?

Comment:

14. How does your subject lend itself to being taught with the use of ICT?

Comment:

15. Which of the following do you feel are *essential* and which are *desirable* skills for using ICT in the classroom? (Please indicate the appropriate ones)

essential

desirable

- | | | |
|--------------------------|--------------------------|----------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | the ability to set-up a lap-top, projector and screen |
| <input type="checkbox"/> | <input type="checkbox"/> | the ability to use PowerPoint presentations which have been prepared by others |
| <input type="checkbox"/> | <input type="checkbox"/> | the ability to make your own PowerPoint presentations |
| <input type="checkbox"/> | <input type="checkbox"/> | a thorough knowledge of the institutions IT policy |
| <input type="checkbox"/> | <input type="checkbox"/> | a thorough knowledge of computer software packages |
| <input type="checkbox"/> | <input type="checkbox"/> | the ability to deal with problems that students may have with their PC's as they arise |

Others: (please specify)

16. Do you think that your courses could be delivered online? Yes No

17. If yes, how could this be achieved?

Comment:

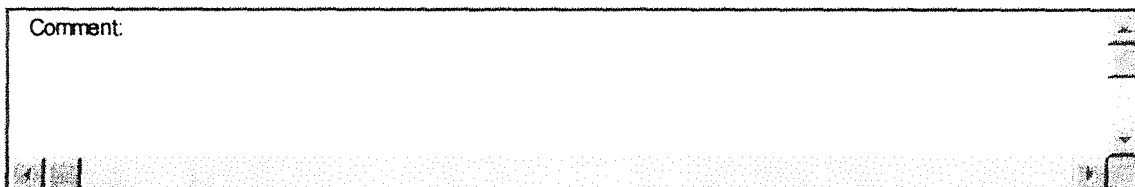
18. Do you think that your curriculum area has sufficient access to ICT?

Yes No

19. Have you considered putting your courses online? Yes No

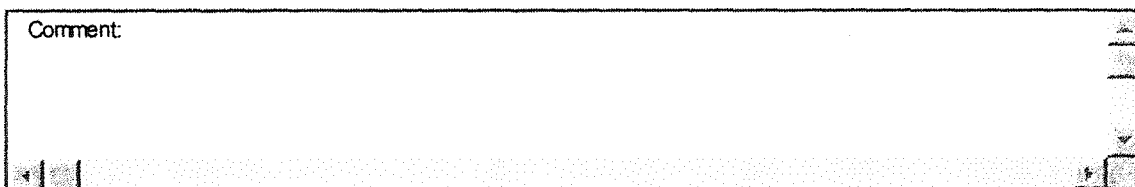
20. What do you think are the main issues in putting your course online?

Comment:



21. What incentives/disincentives are there for using ICT in the classroom?

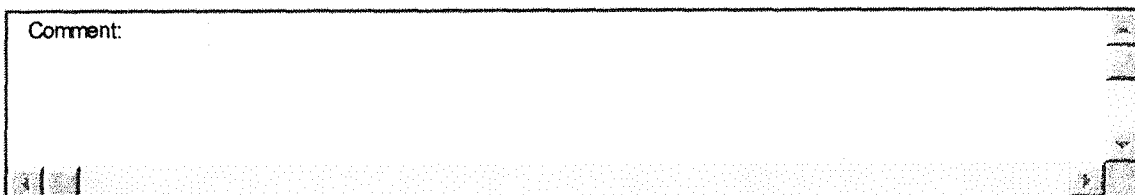
Comment:



22.a) Do you use ICT for assessment purposes? Yes No

22.b) Please comment on how you are using ICT for assessment purposes or how you think it could be used for assessment purposes.

Comment:



**The questionnaire is complete. Thank you for your assistance and cooperation.
Your help is very much appreciated.**

**Please place the completed questionnaire in an internal envelope and send it to:
Antony Card, 'W' Block.**

**If you have any other comments or questions then please direct these to:
antonymcard@hotmail.com**

Appendix ii

Interview with John, a manager with some responsibility for the development of ICT

Interviewer: Can you please identify the skills that you think are essential or desirable for using ICT in the classroom?

Participant: The ability to use a laptop and screen; strangely enough because we actually pull this stuff down from (the central office) at the moment, there have been a few times when I have gone over, that although the leads are supposed to be checked that is often not the case and someone has rearranged or re-changed the default set-ups on the laptop. It is not a simple case of going over there, hiring the laptop and projector with the expectation that it will work immediately. However, they have done the best they can, but I think it is essential that you are taken through the processes with some very simple trouble-shooting even in the order of when you turn the laptop and projector on, because it can have an effect as to where the actual machine will come on or not.

The other one, the ability to use PowerPoint presentations that have been prepared for you or by others is essential. We all have a different teaching style, if we are using a standard form of documentation, which if you were doing a curriculum 2000 interview which is supposed to be across college, if you were to take that to a small group such as I have this year specifically interview students for a public services programme you then need to have the ability to be able to go in and edit and at least understand how they put that programme together so that the transitions as you go between each slide and the graphics come in, how it actually .. (Hum)... hiding slides absolutely.

The ability to make your own PowerPoint presentations, I see that as essential as well. What is the point in using state-of-the-art technology if you haven't got the software skills to implement it. Of course, the truth works in the reverse, what is the point in developing the PowerPoint skills if the institution is not prepared to investment through providing PowerPoint projectors and laptop computers.

A thorough knowledge of the institutions I.T. policy is desirable. I say desirable as opposed to essential. Really it would fall between the two. It is essential because of the Data Protection Act and also on the use of software applications that are owned by the software companies, such as the Microsoft Purchasing agreement and user licenses as well as copyright agreements. But it is also desirable from the point of view of your own circumstances and where you sit because for some of the Internet sites we have firewalls to prevent students from accessing pornography. There are other ways of getting around it and I don't think that firewalls are truly effective.

Interviewer: Have you experienced problems with this?

Participant: Yes, rotten.com and information like that has been downloaded. Students also use chat rooms and PC's are not being used for the intentions for what they are in the college, which is a learning tool and a way to present assignments. I think there needs to be enough ways to give students an interest from material from outside of the college material to actually download certain materials from the Internet but is it really necessary for them to be downloading MP3 (music) files, rotten.com, pornography sites, use of chat rooms and hotmail for any and all reasons other than as a facility for being here to learn and text messaging, of course. So, but although I say it is desirable, it is O.K. having it as a policy document saying that if students are seen to be using these sites then you have a duty as a tutor to go in and prevent their use, that is very difficult if you do not know the students. I would imagine for a tutor that may not be overly confident in being assertive with a group of twelve testosterone driven young men around a computer looking at pornography or looking at sites that they should not be doing. I just think it is desirable, well, where do we actually stand on this? Because, and I am using rotten.com as an example because it pertains to, really it is quite a sick site as it pertains to dismembered bodies, road crash people, suicide. In one area, quite how you would describe this I do not know, but where they do Road Traffic and Transport in Public Services they have downloaded a road crash with a victim hanging out of a car and they have put that into an assignment. Who is to say that it is wrong, but can you see where I am coming from. Some of these things are a little bit woolly and they come down to personal morality and ethics, what you allow and what you don't allow.

A thorough knowledge of computer software packages I put down as desirable as opposed to essential. The words essential and desirable are a little bit black and white, which is good in the way that the questionnaire has been put together but it doesn't allow for much transition between the two. It is very desirable, because most people I would see it as having essential knowledge, for others it is desirable. If you are using computer software packages, if the question is looking at something like the Microsoft packages, then it is essential. If you are looking at computer software packages that are an aid to learning through underpinning knowledge, for instance, then the insertion of a CD - point-and-click, it is desirable that they understand how it is used, but not really essential that they understand how it has been put together.

The ability to understand the problems that students may have with their PC's is desirable, very much so, as opposed to essential. Having taught I.T. here at the college and still continuing to do so, the sheer essence of a student making a mistake and continually taking that forward in an I.T. application, by just using the undo button and going in and trying to re-look at the defaults... you know... is about the standard that I would expect, is desirable. It is not essential to have the ability to go right through the student's work to find out that they made an error thirty-five, thirty steps ago, especially if it is a hardware-based problem as opposed to software. I think it is desirable to have some knowledge of software

troubleshooting, possibly some hardware trouble-shooting knowledge but not that aspect in an I.T./technicians environment.

Interviewer: From your manager's perspective, how is I.T. used in the classrooms across this school?

Participant: It depends on the level of program, although it is changing and increasing exponentially. We have all of our low-level programmes, equivalent to First Diploma on the Public Services, for instance, it is a requirement that their assignments are typed. On the other hand, our NVQ Level 1, which is also a foundation course, it is underpinning knowledge, which only requires hand-written contextual statements. That is changing next year; their underpinning knowledge is going to be delivered on CD-ROM. It is a software application for testing knowledge, it is inserted into a P.C. and it involves pointing to pictures and then being awarded a score. The theory is delivered alongside their practical lesson, which is when they take on the knowledge. The actual testing for that is going to be done from CD-ROMs. It is really used as a testing tool. It marks it, scores it and they can use it in their portfolio of assessed work. It reduces tutor time in marking the assignment, coming-up with the grades and filling in the necessary statements. It helps the students with the one thing that they do not like which is writing contextual statements by hand when we have the Key Skills programme to do that. I am not going to enforce that on the practical sessions with the types of students that we have got. Some may say by bringing them into the mainframe then that is the idea of key skills. In reality that is great but with the extremely low level of academic ability here we cannot rectify in two years what schools had 10 years to target.

Interviewer: To what extent is ICT integrated into the classroom activities in this school?

Participant: I will have to step back slightly towards the students' perspective on this too. For our high-level courses it is our expectation that all students will use I.T. Our HND/HNC courses require the use of additional software packages as well such as SAGE Accounting and industry-specific software for hotel bookings programs. The other thing is as far as our staff is concerned, the ratio of computers to students is almost the same as what it is for staff. We have an extremely poor amount of computers in relation to staff; we have not got enough. The ratio is about 1:5, so it is not good. The staff want to see an improvement in that. All of their schemes of work, all cross-college documentation, programme review boards and, of course as you would expect, everything is processed by the lecturing staff as opposed to the school administrator. The use of PowerPoint is used in programmes and courses and schools liaison roles. We would like to see much more use of PowerPoint, aside from classes. If finances were available to provide tutors with laptops and projectors. Maybe not each, but between a core curriculum group. At the moment it is really only viable when we do staff development, conferences and full-cost paid courses; we do use it then as appropriate.

Interviewer: Are there other ways that it can be done other than getting equipment from (the central office)?

Participant: Only for it to come outside of the schools. We have actually made efforts this year in our school through some private conferences that I have run along with my colleague (name) who must take a major part of the credit for that. We have drawn money down from FEDA to demonstrate level 1 skills. They gave us twelve thousand pounds to do that for the two days. Four and a half thousand pounds of that has been earmarked for the school for a projector and a laptop. But it remains centralized in the school, but that is still not enough for our entire program provision. So that will remain a permanent fixture in the I.T. suite because that is where it will be best used and applied for the majority of teaching. There is an irony to this that as we are trying to develop the I.T. within the department we have lost the room. So as a department we are trying to take it forward and trying to argue the case that it needs to stay here and demonstrate that we are taking an active role in this and trying to use our I.T. development but they are obviously taking the room from us. The irony is that they want us to develop I.T. in our department but they have now taken that room from us. (note: new I.T. rooms were being built in a refurbished building on campus away from the department - students/staff will have to relocate for I.T. use). What we will do is just get a stand-alone projector that we will keep in the department which we will pull out for full-cost courses. The other thing added to this how we take I.T. tuition seriously through time and effort, through drawing down funds from FEDA once again I managed to get the money to run this pilot scheme to get the underpinning knowledge on CD-ROMs. All the machines in the college don't have CD-ROMS; so I managed to get 14 CD-ROMs through FEDA to actually develop and pilot this software only to find that we have now lost the machines. So it is like I am coming up against brick walls for an initiative that I am trying to take forward. It is quite exasperating when I try to develop the I.T. with individual areas when there seems to be no forward thinking through strategy as it were. They have removed from us a prime resource to service centrally. Why could they not, for the extra 20% of the time that the room is being used have brought those classes here, rather than 80% of our provision will now have to go to another block, is just a strange one on me.

Interviewer: How fast are those PC's in that room?

Participant: They are not particularly quick. Now I do understand it from the point of looking at service. We are a separate server over here because we are a building that is in isolation we are serviced through the semantics of the operation slightly separately which is apparently going to ease the problems of I.T. operation although I am not convinced that we get a great deal of problems in (the name of the particular room). It could be that some of the problems are blown out of all proportion by some tutors

but I seldom have problems in there and I teach in there three times per week.

Interviewer: Do you have any issues with using ICT in the classroom?

Participant: The main login problems that I get in that room are students forgetting their passwords which is a standard thing and there is a phone in there. So I don't understand the rationalization for moving it; I think it is purely financial and not for the benefit of the students. It is certainly not to the benefit of the department. The amount of time and effort that we have put in to try and, as I say, I must emphasize this to develop the software, to purchase the CD-ROM drive in the first instance. What is quite amusing, I suspect that now that 80% of our provision has to leave this teaching block I bet that they will do something daft like putting the new computer room on the 7th floor of tower block. They should try to keep it on the first or second floor. As soon as you get to floor 3, 4, 5, 6, 7, 8 and 9 it becomes a real chore getting up and down and on time and starting classes. With the timetable structures as they are that might be a bit of an issue.

Interviewer: Do you have any thoughts on other types of technology and how they could be used in the classroom?

Participant: Electronic whiteboards. Having seen them, and I have actually used them at the (name of previous institution), I was not particularly impressed. They are a very, very expensive luxury. Yes, with an electronic whiteboard you can print them out at the end but with students doing their own spidergrams and brain storming as well as tutors doing it on the board, what is the point? Perhaps you can do almost the same with a PowerPoint projection and a white background and just typing the words as they appear. I am not convinced that is a good use of money; it is quite expensive. Ours were always prone to breaking down and it wasn't as if it was from one of the suppliers. The (other institution name) were quite astute and they had three or four different suppliers and they bought them in so that we could play off one machine against another expecting one to operate better than the other. As it were, they were all useless.

I am certainly not against new technology; I am an advocate of it. I have seen it happen so many times in Colleges, this is my fifth college, and I have seen new technology implemented too quickly, which is still behind what the private sector has anyway without any real forethought.

Interviewer: What are the barriers in getting staff to use ICT?

Participant: As I say, we still have about, I don't care how many permutations, the managers may have a computer to themselves, I have myself, personally speaking but I know that for my colleagues in one office it is 1:5. In actual fact it is 1:5 in two of the offices that I am thinking of at the

moment. So I mean, what is the point in staff doing PowerPoint if they can't prepare it on their own PC, let alone having a laptop and projector in another classroom?

Interviewer: What about the use of technicians for support in the classroom?

Participant: That would be superb; I think they would use it then. There are some resource implications attached to that but it would be superb. It would be good if you could have a strategy that goes beyond the school if you had faculties as opposed to schools and larger areas it might then be financially viable to have an I.T. technician that supports that one area, so that they are then an expert for the software that is used in that one department. What they do in Computer Aided Design bears no relevance to over here. So it must be quite difficult for the I.T. technicians but they could have a cycle so that it benefits their skills with having six months in each curriculum area. I think that it would suit them better so in that way you would have a technician in your area operating from the room that knew the software, the problems, the trouble-shooting, set up the projector in having them in a department as opposed to centrally. They can still be responsible centrally, but at the moment with them being based centrally when they are actually on call-out doing the rounds, instead of having to go to the schools wouldn't it be better if they were there for the day, as opposed to flitting around somewhat. Now that does not address the problems of areas outside of teaching, but I am sure you would only need one technician or two which would service the central systems and the other could be around the teaching situation, so that they basically have that 'on-call' situation as well. But of course, that would mean a sense of commitment and people need to relinquish their power base in order to achieve that.

Interviewer: How do you see the role of the ILT champion?

Participant: To be honest, it has not been made clear. The first year that I was here I was involved in the strategy group and I was only able to attend a limited number of meetings. The Curriculum 2000 initiative took off ...

I have a passion for I.T. and I think it gets knocked in this college. Having worked in all of the other colleges, it is a little bit annoying to me when I get to meetings and we butcher I.T. and how it is running in our college. This is by far the best I have ever seen a college working with its I.T. The college I came from and, once again, ... they were still running Windows 3.11, on 486's, with 0.5 meg graphics cards and I came here and it was like a revelation, which had just gone to NT, we had Pentium PC's, we had a server that was working, we had laptop and projectors that we could take from central purchasing; it was like a breath of fresh air. We had e-mail we didn't have that at my first college, they had only just implemented that, it was desperate, dire. The college before that, I know as technology moves forwards but this was only 18 months ago and there is no way that they have made those strides forwards as we have here with our development in technology so that

really annoys me. I don't think that the I.T. manager (mentioned by name) really gets enough praise for that. He just gets a hit list every time that man is in a meeting; he does a bloody good job.

There is something else. What is a little bit disturbing, a bit annoying somewhat is we have industry working to Windows 2000 and we need to upgrade or go along that route, but ultimately we need part of that to be on the system, piloting or testing somewhere so that when it actually goes on mainframe the defaults are fine, problems with accessing it because sometimes you go into word and some clipart will come up, some doesn't, these things need to be addressed now. So piloting somewhere now, for the future, not just loaded-up to run one day as inevitably has always been the case, not just at this college, but others. (brief discussion about Windows XP being available to students at home)

I am sure that I am not the only one, I am not a saint by any stretch of the imagination, but I do actually do a lot of work at home and I have Windows 2000. The majority of PC's for home use are sold as Windows 2000 nowadays or XP. But as a consequence what about the students with the work that they are doing at home, bringing into college to print-off, to re-evaluate, re-do. It is all very well us thinking from a business point of view, but we need to look at what is available on the home PC market, when students buy these systems. They are not going to buy Lotus 123 are they, they go for Microsoft Office as this is what is out there and this is what the students are using. It is all very well us looking at it like a business, but I mean Windows 2000 will run quite comfortably on these Pentiums. I don't know what peoples concerns are. We have a lot of people in the schools who are software experts but there are a lot of people in the departments that consider themselves to be hardware experts. X - is past it and Pert is a dribble of water. I think sometimes they do not know what they are talking about and decisions like that need to be left to the true experts and consultants. You are always going to be playing catch-up with technology anyway.

Interviewer: What are your views on staff development and the courses that are currently being offered in I.T. and ICT?

Participant: Fine, no problems. I would like to see, I mean that the department went ahead again and made its own purchase of a digital camera because we use that as a way of quantifying evidence for our students when they are on a residential we might take a photograph of them participating in their physical activity. The students in their vocational programmes these at NVQ 1, 2 and 3. If you take a photograph of a dish they have produced then that is their evidence and it saves them writing about it or putting in a menu. What better than a digital camera? We have got a vast number of printers in the college, some of those are quite modern, but very few of those are colour. There are no real colour printing facilities here at the college which is a bit annoying, very few laptops, very few projectors.

There is one important thing that I would like addressed, with all of these moves forward with technology I would really like the opportunity on leave or on Sunday afternoon to access my files here at college, so that I can download material, work on, mark assignments, send it back in etc. At the moment the only way that I can do that is by coming in to college. Now I know that will cause some concerns because people may take advantage of that and use the expression 'working from home' but that is something that the managers would have to quantify by getting the teachers to provide evidence. So I can see the problems behind that because people will say, "we are professionals why should we demonstrate A, B, C, D, and E", but I do think for people that would use that facility that would be advantageous. I do think that that facility should be available to staff, perhaps not students.

The other thing that needs to be mentioned is that the developments that I have made on the Internet for our department to be used as a pilot for other programmes in our area. There is no one really with good Internet development skills to help us move forward in that area. Then there are all of the other problems of once all of this stuff is on the Internet, who has the authority to upgrade and edit, because a consequence of being on the Internet is that it reaches a wide array of people, so you only want certain people editing it. But by putting on supporting handouts etc. then these once again need to be 'read-only' access because the temptation is there that amongst that whole myriad of handouts students can just cut, copy, paste. I am sure that they can put half a dozen assignments together just on the strength of cut, copy, paste of the lecturers' notes, so that needs to be addressed.

Organizations concerned with the development of ICT

**The National Learning Network (NLN)**

The NLN supports ILT across the FE sector and acts as an umbrella organisation for the projects arising from the government's £74 million, three-year investment in ILT for Further Education.

The National Learning Network is the umbrella term that has been coined for the entire package of measures that have arisen from David Blunkett's announcement in December 1998 of a £74 million three-year Government investment in information and learning technology (ILT) in further education. This sum will be supplemented by the £100 million that colleges are estimated to spend annually on ILT to support an all-embracing approach to ILT that will improve hardware and connectivity, develop staff skills, provide learning materials and guide effective learning, teaching and management. Detailed implementation plans developed by FEFC's ILT Committee cover finance and timescales for:

1. A 2 Mbps primary connection to JANET for all 433 sector colleges, with ISP services provided free of charge by UKERNA for the duration of the project
2. A technical support centre in each of the nine FEFC regions
3. Financial support to update LANs and computer equipment
4. Financial support for technician training
5. Support for managers, including guidance on producing an ILT strategy, on the total cost of ILT ownership and on benchmarking LAN performance
6. Functional and technical guidance on managed learning environments (MLE)
7. Development of a FENTO-validated programme of staff ILT competencies, supported by a wide-reaching on-line ICT training resource
8. An ILT Champions residential programme in June/July 2000 to enable two delegates from each college to update their skills and understanding and cascade training back to colleagues
9. Audit and mapping of currently available materials to support ILT-based learning
10. Commissioning and purchase of new materials to support ILT-based learning
11. Finance to support in-house development of materials and the acquisition of multimedia authoring skills by college staff.

The planning, preparation and delivery of the National Learning Network has brought together the ILT communities in both further and higher education in both spirit and practice and augers well for future co-operation between the sectors and their representative bodies.



The British Educational Communications and Technology Agency (Becta) is the United Kingdom's lead government agency for Information and Communications Technology (ICT) in education. Becta's role is to evaluate new ways of teaching, learning and managing with ICT, and to promote techniques that improve standards, increase participation and help schools and colleges become more effective. Becta's work includes assistance in content, practice and the infrastructure. Becta's primary mode of disseminating its work is the Web-based National Grid for Learning (NGfL), the United Kingdom's national focal point for learning on the Internet. The NGfL is a diverse and constantly evolving collection of Internet-based education resources targeted to sixth form colleges, further education, higher education and lifelong learning. It contains resources and discussion forums for teachers, tutors, school and college managers, parents, and learners of all ages, as well as links to similar sites in Northern Ireland, Scotland and Wales, as well as others around the world. In addition, the NGfL contains links to libraries, museums, and other relevant government agencies (<http://www.ngfl.gov.uk/>)



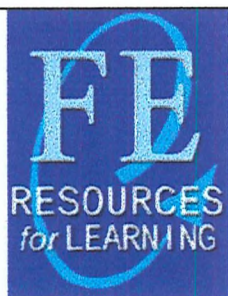
For school and college managers, Becta advises on how to purchase and implement the necessary IT infrastructure in the most cost-effective manner, and, where appropriate, tests and certifies systems to ensure that they meet minimum standards. Their conclusions are disseminated through the NGfL Certified Managed Services site, which reports on tests of ICT-related products, services, and certified suppliers and provides framework contracts for purchasers. Their aim is to remove the time and resource burden from managers and educators, and provide them with the best route to using IT effectively within the classroom. This service is designed to provide users with an integrated package of equipment, facilities and services, including clear points of contact for support and advice (<http://managedservices.ngfl.gov.uk/>). Becta also evaluates emerging technologies in order to assess their potential for use in education.



For teachers, the NGfL site hosts the **Virtual Teacher Centre** (<http://vtc.ngfl.gov.uk/>), which provides materials to support teaching and learning in all curriculum areas at the primary and secondary levels by subject and key stage, and includes attainment links, targets and schemes of work. This online Centre also offers teachers and school managers a forum for sharing best-practice ideas and for collaborative problem solving. Teachers also can access relevant government information and services through TeacherNet. (<http://www.teachernet.gov.uk/>).



The NGfL site includes a catalogue of resources for professionals and parents to support individual learning needs of special education students, and access to relevant resources on Web sites around the world (<http://inclusion.ngfl.gov.uk/>).



The **Further Education Resources for Learning (FERL)** Information Service provides information and guidance to lecturers and support staff in further education colleges (<http://ferl.becta.org.uk/>). The (FERL) site includes curriculum-based software and Web sites, with independent reviews carried out by FE practitioners; case studies of good practice written by FE staff; a listing of events relevant to the FE sector; research reports; guidelines on the production of an Information and Learning Technology (ILT) Strategy for further education colleges; links to sector organizations and other useful sites; articles; news; and special features, such as the feature on Managed Learning Environments (MLEs).

Lifelong Learning

Related to further education, the Lifelong Learning site (<http://www.lifelonglearning.co.uk/>) is designed to encourage, promote and develop lifelong learning in the UK. It contains news, government reports and information on other aspects of lifelong learning including Career Development Loans, Individual Learning Accounts and Learning Direct - a free learning and career information telephone service.

Learning+Skills Council

The Learning and Skills Council is responsible for all post-16 education and training. The Council has brought together the skills of the Training and Enterprise Councils and the Further Education Funding Council to work with partners, employers, learning providers, community groups and individuals to develop and implement strategies that meet the Government's aims set out in the 'Learning to Succeed' White Paper. It works alongside the Employment Service, the Small Business Service, Connexions, the National Training Organisations, further education and sixth form colleges, and representatives of community groups, to understand, define and then meet training and education needs. The Learning and Skills Council's national office is based in Coventry, with 47 local Learning and Skills Councils across England



The university for industry, Ufi Limited, was created in 1998 as the government's flagship for lifelong learning. It is a unique partnership between government and the private and public sectors. Within a year of becoming fully operational in October 2000, it had created with its partners **learndirect** - the largest publicly-funded online learning service in the UK. Ufi Limited's mission is to work with partners to boost people's employability, and organisations' productivity and competitiveness



In its Green Paper, 'The Learning Age', the Government set out its vision of 'a learning society in which everyone, from whatever background, routinely expects to learn and upgrade their skills throughout life. 'Backed by Government, Ufi was created to make that vision possible. With ambitious plans to bring learning and skills into people's lives, Ufi developed the **learndirect** service.

Appendix iv

Glossary of Terminology

Apple MacIntosh A popular model of computer made by Apple Computer. Introduced in 1984, the Macintosh features a graphical user interface (GUI) that utilizes windows, icons, and a mouse to make it relatively easy for novices to use the computer productively.

Asynchronous Learning Learning that is not synchronized; that is, not occurring at predetermined or regular intervals.

Authorware a software program that helps in writing hypertext or multimedia applications.

BBC Websites Websites that are provided by the BBC often with a learning goal.

Browsing To move from place to place on the searching for topics of interest on the Internet.

Bulletin board An electronic message center. Most bulletin boards serve specific interest groups. They allow you to dial in with a modem, review messages left by others, and leave your own message if you want.

CD-ROM Short for **Compact Disc-Read-Only Memory**, a type of disk capable of storing large amounts of data.

CMC (Computer Mediated Communication) CMC refers to human communication via computers and includes many different forms of synchronous, asynchronous or real-time interaction that humans have with each other using computers.

Digital Camera A camera that stores images digitally rather than recording them on film.

DVD Short for **digital versatile disc** or **digital video disc**, a type of optical disk technology similar to the CD-ROM. A DVD holds a minimum of 4.7GB of data, enough for a full-length movie. DVDs are commonly used as a medium for digital representation of movies and other multimedia presentations that combine sound with graphics.

Electronic Whiteboards An interactive display board. It combines a whiteboard, projector and electronic data capture.

Firewall A system designed to prevent unauthorized access to or from a private network.

FrontPage A software program to create and manage Web pages.

FTF (face-to-face) Learning in a traditional sense that involves direct contact between the teacher and the student.

Hardware Refers to objects that you can actually touch, like disks, disk drives, display screens, keyboards, printers, boards, and chips.

HTML Short for **HyperText Markup Language**, the authoring language used to create documents on the World Wide Web.

ICT (Information and Communications Technology) See also **ILT**.

ICT Capable A defined set of skill, knowledge and understanding about information and computer technology that is widely shared in an organization.

ILT (Information and Learning Technology) The application of IT (Information Technology) to learning. Synonymously with ICT in a Further Education context.

Internet A global network connecting millions of computers.

Internet Explorer (IE) Microsoft's Web browser. Like Netscape Navigator, Internet Explorer enables you to view Web pages.

Intranet A network based on TCP/IP protocols (an internet) belonging to an organization, usually a corporation, accessible only by the organization's members, employees, or others with authorization.

IT (Information Technology) the broad subject concerned with all aspects of the electronic management and processing of information.

MIS (Management Information Systems) MIS refers broadly to a computer-based system that provides managers with the tools for organizing, evaluating and efficiently running their departments; widely used in Further Education for the processing of student records and financial information.

MLE/VLE Short for **Managed Learning Environment** or **Virtual Learning Environment**. A software tool for delivering and supporting flexible learning using web technologies. It sometimes also incorporated the functions of an MIS.

Netiquette Contraction of **Internet etiquette**, the etiquette guidelines for posting messages to online services, and particularly Internet newsgroups. Netiquette covers not only rules to maintain civility in discussions, but also special guidelines unique to the electronic nature of forum messages.

Netscape Navigator Netscape Communication's popular web browser.

Nodes Part of an Index System used by the QSR NUD*IST program. It is a way of storing ideas, exploring documents and gathering material on a subject in one place.

Office 2000 The use of computer systems to execute a variety of office operations, such as word processing, accounting, and e-mail.

Online Community A group of people that communicate via the Internet.

Operating system Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

Outlook A software program for handling e-mail.

PC Short for **personal computer**.

PowerPoint A software program for visually presenting slides and images via a projector onto a screen or computer monitor.

Program An organized list of instructions that, when executed, causes the computer to behave in a predetermined manner.

QSR NUD*IST (Non-numerical, Unstructured Data Indexing, Search and Theorizing) A software program for qualitative research that can help with creating, managing and exploring ideas and categories.

Read-only access A computer file that is capable of being displayed, but not modified or deleted.

Search Engines A program that searches documents for specified keywords and returns a list of the documents where the keywords were found.

Software Computer instructions or data. Anything that can be stored electronically is software.

SPSS (formerly **Statistics Package for the Social Sciences**) A software program that is used for the statistical analysis of data.

Synchronous Occurring at regular intervals. The opposite of synchronous is asynchronous. Most communication between computers and devices is asynchronous, that is it can occur at any time and at irregular intervals.

User License Agreement An agreement between an individual or organization and a software publishing company concerning how the software may be used.

Windows NT A version of the Windows operating system. Windows NT (New Technology).

Windows XP An operating system introduced in 2001 from Microsoft's Windows family of operating systems.

World-wide-web A system of Internet servers that support specially formatted documents.

(Definitions adapted from: www.webopedia.com)