THE APPLICATION OF E-LEARNING MATERIALS TO TEACHING AND LEARNING IN POST-COMPULSORY EDUCATION IN THE WEST MIDLANDS

Implications for the pedagogy of e-learning materials

Amran Joned

October 2009

A thesis submitted in partial fulfilment of the requirements of Birmingham City University for the award of Doctor of Philosophy

Faculty of Education, Law and Social Sciences

Abstract

The impact of Information and Communication Technology (ICT) on the quality of teaching and learning in schools has been the subject of many studies in recent years. Although these objective studies have reported on the classroom effectiveness of ICT use, there have been limited studies of the underpinning pedagogy. In contrast, the use of ICT in post-compulsory education, particularly further education (FE) colleges has not been researched to a significant extent, either in terms of its effectiveness or the underpinning pedagogy. FE is a diverse, under-researched sector in the UK and is heavily influenced by economic changes, new technologies, competing interest groups and by government policies, institutions, professionals, tutors and learners. The complexity and diversity of this sector present a serious challenge to fully embed e-learning skills and practices in FE colleges. When the research project was about to start, there had not been a study focusing on e-learning materials in the past. This is an important area which requires investigation because if we understand the pedagogy of e-learning materials and how they can be used effectively, then this will improve learning and provide information to help design better materials.

The aim of this research is to investigate the application of e-learning materials to teaching and learning in post-compulsory education in the West Midlands. The research seeks to explore the implications for the pedagogy of e-learning materials and wishes to determine whether the application of ICT and e-learning materials to teaching and learning has been fully implemented by the selected FE colleges. Methodological triangulation is used for the research, a combination of survey in the form of semi-structured interviews and case studies, which used questionnaires and semi-structured non-participant observations.

The main findings of the research are: the e-learning materials were mainly used as support and supplementary to the traditional teaching and learning methods; the prevalence of e-learning materials used depended largely on the courses and the individual tutors; the most commonly used modes of delivery of e-learning materials were application software, VLE, CDROMs, Intranet, Internet and videos; the e-learning materials were considered to be effective learning tools, enhance learning and help learners with different learning styles. Despite many positive results in most areas of investigation, the researcher finds that the application of ICT and e-learning materials to teaching and learning (with a special reference to e-learning skills and practices) has not been fully taken up by tutors and learners in FE colleges.

Contents

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my Director of Studies, Dr. Anthony Coles, for his continuous support, guidance and positive encouragement throughout the production of this thesis; indebted for his concern and understanding all these years.

I would like also to convey my utmost appreciation to Dr. Richard Hatcher, my Second Supervisor, for his support, encouragement, guidance, and constructive comments throughout the research programme.

I would like to thank Ms Miriam Bartlett (Faculty of Education), and Ms Beccy Boydell (the Academic Registry) for their help and cooperation. I would like to record my special acknowledgement to all the research participants, the FE Colleges' Principals, Department Heads, teachers, learners and any other individuals for their direct or indirect contributions to making this research a reality.

My special gratitude goes to my employer cum sponsor, Dewan Bahasa dan Pustaka, for sponsoring my educational and living expenses, throughout the research programme.

Lastly I would like to thank my wife, Hamsiah Hamid, my children, Iskandar Mirza Amran, Faridah Hanum Amran and Nurul Aini Amran for their understanding and support throughout this research. This thesis is specially dedicated to my loving daughter, Siti Zulaikha Amran, who passed away (at the age of 3 years old) on 14th of February 2004 in Birmingham, England when this research was just about to start.

List of Tables

Tables **Page**

List of Figures

Glossary of acronyms used in the thesis

ALT	Adult Learning Inspectorate
BECTA	British Educational Communication and Technology Agency
BERA	British Educational Research Association
CDROM	Compact disc read only memory
DFES	Department for Educational and Skills
DVD	Digital video disc
FE	Further education
FENTO	Further Education National Training Organisation
FERL	Further Education Resources for Learning
IT	Information technology
ICT	Information and Communication Technology
ILT	Information learning technology
IWB	Interactive whiteboard
JISC	Joint Information Systems Committee
LEA	Local Education Authority
LCD	Liquid crystal display
LSDA	Learning and Skills Development Agency
NILTA	National Information Learning Technology Association
NLN	National Learning Networks
OFSTED	Office for Standards in Education
PC	Personal Computer
PDA	Personal digital assistant
TV	Television
VCR	Video cassette recorder
VLE	Virtual learning environment

Chapter 1

Introduction

1.1 Research Background

The impact of information and communication technology (ICT) use in teaching and learning within the school sector has been extensively researched in the United Kingdom. However the post-compulsory education sector has received little attention (see the regular BECTA reports including BECTA, 2007). The post-compulsory education sector mainly consists of further education (FE) colleges which traditionally cater for vocational and academic education for those who have left compulsory education. More recently, the sector has forged collaborative links with schools, consequently it is not uncommon to find learners from the age of 14 in FE colleges. The sector also includes private training providers involved in supporting disadvantaged learners and those returning to education. The sector will be abbreviated as the FE sector.

Steady progress in the use of e-learning and technology has been witnessed since the 1980's but the embedding of Information and Communication Technology (ICT) within FE has proved problematic. One of the reasons could be that when computers are used in the FE sector, they are often presented as tools to find and transmit information to support teacher-directed activities. There could be many reasons as to why ICT has not

been taken up fully by the FE sector. It could be due to lack of funding, lack of expertise to implement ICT in teaching and learning, lack of resources available, or it could be due to barriers to the uptake of ICT by the teachers. BECTA (2004) discuss the main barriers that exist in schools which prevent teachers from making full use of ICT in their work. These were identified as lack of teachers' confidence and their computer anxiety; lack of teachers' competence; lack of access to resources; lack of time; fear of things going wrong and lack of technical support; resistance to change and negative attitudes; and the issue that teachers did not perceive that there would be benefits if they were to make full use of ICT in their work.

The aim of this research is to investigate the application of e-learning materials to teaching and learning in post compulsory education in the West Midlands. In doing so the research seeks to explore the implications for the pedagogy of e-learning materials and to determine whether the application of ICT and e-learning materials to teaching and learning has been fully implemented by the selected FE colleges. Please refer to Section 1.5 (Research context), which highlights the justifications for undertaking this research.

The main objectives of the research were: to identify the range of settings in which e-learning materials are used; to investigate the mode of delivery of e-learning materials used; to investigate the ways in which e-learning materials are used and applied; to study the implications for the pedagogy of e-learning materials; to identify the learners' attitudes and perceptions on the application of ICT and e-learning materials; to identify the teachers' attitudes and perceptions on the application of ICT and e-learning materials and to examine the actual application of e-learning materials in FE colleges

through classroom observations. Apart from the above objectives, the research has investigated other factors that were considered crucial for ICT to be implemented and taken up fully by FE colleges. The research also explored how the teaching staff deal with variations in learners' ability to use ICT and e-learning materials; problems to deliver e-learning materials; how is e-learning organised in FE colleges; the colleges' involvement with outside organisations with regards to ICT use; the colleges' current key development issues; and their plans for ICT use in the near future.

Methodological triangulation is used for the research, a combination of survey in the form of semi-structured interviews and case studies, which used questionnaires and semi-structured non-participant observations. For the purpose of this research, the face-to-face interview was used as the principle means of gathering data, having a direct bearing on the research objectives, while questionnaires and the classroom observations were used as additional methods of data collection and as means of providing corroboration and triangulation.

The first phase of the study (pilot), involved investigating patterns of ICT use in a single college; mainly to test the survey instrument. A full survey was then carried out (second phase of the study) and 13 key staff were interviewed from nine different FE colleges. The colleges were selected based on their Office for Standards in Education (OFSTED) report as having effective use of ICT. The 3rd phase of the study was to carry out case studies (using questionnaires) involving three different FE colleges. The criteria for the selection of these colleges were mainly based on the active use of e-learning materials in their curriculum areas, based on results from the semi-structured interviews conducted earlier. A total of 153 students completed the Learners' Questionnaires and

15 teaching staff completed the Teachers' Questionnaires. The final phase of the study was to carry out detailed classroom observations to track how selected learners were engaging with ICT-based learning resources. The activity of the learners was recorded, as was the activity of the teachers for comparative purposes. A total of 12 teaching sessions from three different FE colleges were observed, to witness how e-learning materials were being applied in classroom teaching.

Some parts of the research findings have been presented and discussed in four international conferences (ECER 2005, 2006 and 2007 - European Conference on Educational Research and ICEI 2008 – International Conference on Educational Innovation). The first conference paper which was presented in Dublin, Republic of Ireland (September, 2005) discussing *Models of ICT Subject Pedagogy Implemented in Post-16 Teaching and Learning*, (Joned, A. and Coles, A., 2005) based on findings from Chapter 4. The second conference paper which was presented in Geneva, Switzerland in September 2006, reported most of the findings from Chapter 7 under title *Application of ICT to Teaching and Learning in Further Education: Teachers' Perspectives* (Joned, A. and Coles, A., 2006). The third conference paper which was presented in Ghent, Belgium in September 2007, discussing findings from Chapter 8 of the research. The title for this conference paper is *ICT Use in the Learning and Skills Sector: The Learners' Perspectives* (Joned, A. and Coles, A., 2007). The fourth conference paper which was presented in Kuala Lumpur, Malaysia in May 2008, discussing some of the findings from Chapter 5. The title for this conference paper is *Transforming Post-compulsory Education in the UK with New Technology: use of ICT in teaching and learning* (Joned, A. and Coles, A., 2008).

1.2 The Strengths and Limitations of E-learning Materials as Mediator for Learning

E-learning materials can be defined as any kind of learning resources that enable people to engage in learning activities using information and communications technology tools such as courseware, software and web-based e-learning materials. The use of VLE (Virtual Learning Environment), CDROMs, Application Software, Intranet and Internet (web sites) has becoming an increasingly popular mode of delivery of e-learning materials in the FE sector in the UK. The advantages of e-learning materials are that, they have become an increasingly important tool in any learning environment. They contain the materials to be learned and guide the learners' learning process. A study by Frith *et al.* (2004) on the effectiveness of interactive computer tutorials for an undergraduate mathematical literacy course, has demonstrated that in some aspects the computer tutorials were more effective in conveying concepts than the lecture sessions.

The UK government's Post-16 E-Learning Strategy Task Force defines e-learning as:

> learning with the help of information and communications technology tools. These tools may include the Internet, Intranets, wireless networking, PC (personal computer) based technologies, handheld computers, interactive TV and also e-technology to support traditional delivery for example using electronic whiteboards and video conferencing.
>
> (DfES 2002a: p. 2)

The Learning and Skills Development Agency (LSDA, 2004: p8) on the other hand, defines e-learning as:

> the use of electronic technology to deliver, support and enhance teaching and learning.

In their revised definition of e-learning, LSDA and FENTO suggested that there are four components which are interrelated and need to be considered in understanding e-learning: information technologies (IT); information and communications technologies (ICT); e-learning; and information and learning technology (ILT) (Figure 1).

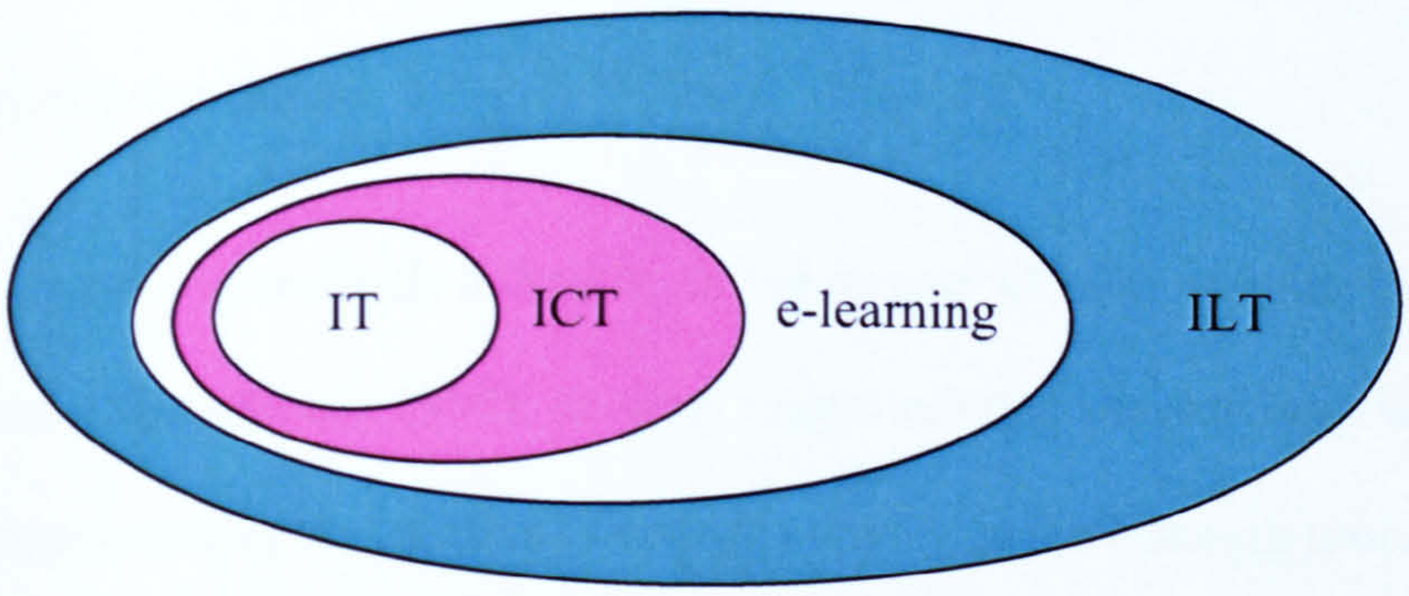


Figure 1: LSDA eclipse model (LSDA, 2004, p.8).

IT	Information Technology	The computer infrastructure, hardware and software used to process data and deliver information.
ICT	Information and communication technologies	The combination of computing and communication technologies (including computer networks and telephone system).
E-Learning	Electronic learning	Learning supported or enhanced through the application of information and communications technology
ILT	Information and learning technologies	This is used in further education to refer to the use of information and communication technologies to support the core business of colleges: the delivery and management of learning.

Technological developments demand new skills in order to synthesise, interpret and apply the information available. It was claimed that new technology is leading to greater emphasis on the development of thinking skills (Frear and Hirschbuhl, 1999). According to them, the interactive computer-based multimedia are currently used by schools as a tool to develop the thinking skills required to assimilate and transform large quantities of information.

There is a growing research literature on the impact of computer-mediated learning in classrooms (McGuiness, 1999). It was suggested that interactions with technology provide opportunities for learners to engage actively in the learning process and develop their thinking skills. Apart from that there is evidence to suggest that technology offers new possibilities for interdependent, collaborative and self-regulated learning approaches(McGuiness, 1999).

Frear and Hirschbuhl (1999) investigated the use of interactive multimedia to promote thinking. These researchers studied the effects of an interactive multimedia approach in comparison with a more traditional approach to environment science. Their research has shown that there is little empirical evidence which relates to the use of interactive multimedia instructional technologies in higher education. Apart from that they claim that there is a lack of research on the effects of a self-paced interactive multimedia computer simulation on students' learning motivation and attitude.

Gibson (2001: p38) identified some limitations of e-learning materials. According to him:

> technology use in classrooms disturbs the ecology and the dynamic of teaching.

He further stressed that:

> differences in technological experience still exist between boys and girls; children and adult; students from different socioeconomic classes; and students from different cultural groups.
>
> (Gibson, 2001: p.38)

Assuming the existence of lack of technical skills among the students, Gibson (2001) identified the range of new skills the students need to learn as another limitation of e-learning materials used in teaching and learning.

1.3 Research Objectives

For the purpose of this research, five objectives have been identified. The first objective is to identify the range of settings in which e-learning materials are used in post-compulsory education. The main curriculum areas, which used e-learning materials in post-compulsory education and the extent to which e-learning materials are used in these curriculum areas, will be examined.

The second objective is to investigate the mode of delivery of e-learning materials used in post-compulsory education. The focus of this investigation will be on the different modes of delivery of e-learning materials and will seek to identify their strengths and weaknesses. Under the same investigation, emphasis will also be centred on the primary sources of e-learning materials used and the prevalence of VLE use as mode of delivery of e-learning materials. The arguments for and against the commercially produced e-learning materials with those that were self-developed by the FE colleges will be also included in this investigation.

The third objective of the research is to investigate the ways in which e-learning materials are used and the implications for the pedagogy of e-learning materials in post-compulsory education. The focus of the investigation will be on how e-learning materials are being used in teaching and learning: are they used for assessment; are they used to simulate events; are they used to reinforce learning; are they used for a whole session or part of a session; are they used with the whole class or group; and are they used on demand by students or its use is planned by the teachers. As for the implications for the pedagogy of e-learning materials, investigation will be focused on the following: is there a particular aspect of the syllabus for which e-learning materials are particularly suitable; how effective are the e-learning materials; why are e-learning materials used; is there any evidence that they enhance learning; and what would be the effect of not using the e-learning materials. The relationship between e-learning materials and the learning styles of individual learners will also be part of this investigation.

The fourth objective is to identify the teachers' attitudes and perceptions on the application of ICT and e-learning materials used in post-compulsory education. In meeting this objective, the focus of this investigation will be centred on the following areas: technology and teachers; technology usage; technology support; technology content; and technology impact and learning outcomes.

The fifth objective is to identify the learner's attitudes and perceptions on the application of ICT and e-learning materials used in post-compulsory education. Quite similar to the fourth objective, the areas to be investigated will be on technology usage; technology support; technology resources; technology content; and technology impact and learning outcomes.

Apart from the main objectives mentioned above, an investigation into the main issues related to the application of e-learning materials used in post-compulsory education sector will also be carried out. There are altogether six areas to be investigated in meeting these objectives: how the teaching staff deals with variation in learners' ability to use e-learning materials and ICT related equipments and technology; the problems in delivering e-learning materials in FE colleges; how is e-learning organised in FE colleges in terms of staffing, sources of funding and the college ICT strategies; is there any involvement with outside organisations with regards to ICT use in teaching and learning; the colleges' current key development issues; and the colleges' future plans for ICT use.

The research will also conduct observational studies to examine the actual application of e-learning materials used in the selected FE colleges, the findings of which will be discussed in Chapter 7 and Chapter 8.

1.4 Research Context

Much research into ICT use has concentrated on the school sector. The use of ICT in post-compulsory education, particularly further education (FE) sector is under researched. Post-16 learning in the UK is wide and diverse and heavily influenced by economic changes, new technologies, competing interest groups, government policies, various institutions, professionals and the learners themselves. According to Coffield *et al.* (2004: p6):

> the learning and skills sector which was created by the Act of Parliament in 2000, is an amalgamation of different tradition in post-16 education and training, and comprises a huge number of organisations (providers, inspectors, awarding

and regulation bodies) all with different systems for designing and implementing the curriculum, assessing quality and training practitioners.

These researchers find that there are particular traditions, cultures and ideas about teaching and learning within different post-16 contexts that create both opportunities for and barriers to the widespread use of e-learning materials across the sector. It was felt that the complexity and diversity of this sector would present a serious challenge to fully embed e-learning skills and practices in FE colleges. As such the potential for ICT to improve post-16 learning should consider the following key factors: the enormous range of students; the increasing number of non-traditional students; large number of untrained part time tutors; lack of funding for hardware and software; limited staff expertise; and shortage of e-learning materials.

In order to address the research aims and objectives and to develop an understanding of the pedagogy of e-learning materials, the following research questions will be addressed:

(i) Which are the main courses that use e-learning materials in FE colleges?

(ii) What are the modes of delivery of e-learning materials used in FE colleges?

(iii) In what ways have e-learning materials been used and applied in teaching and learning situations?

(iv) What are the implications for the pedagogy of e-learning materials?

(v) What are the main issues related to the application of e-learning materials used in FE colleges?

(vi) What are the teachers' attitudes and perceptions on the application of ICT and e-learning materials used in FE colleges?

(vii) What are the learners' attitudes and perceptions on the application of ICT and e-learning materials used in FE colleges?

(viii) Has ICT (e-learning skills and practices) been fully taken up by tutors and learners in FE colleges?

1.5 Structure of the Thesis

The thesis is organised into five parts and is comprised of nine chapters. The first part consists of Chapter 1, which describes the research background, the research objectives, the research context, originality of the thesis, and include a brief discussion on the strengths and limitations of e-learning materials as a mediator for learning.

The second part consists of Chapter 2, which presents in detail the literature review and documentary analysis. The main areas of study included in the literature review are the following:

- Technology in education.
- The impact of technology on pedagogy.
- Technology and the development of thinking in post-16 education sector.
- Learning styles theory and its implications for pedagogy.
- Issues relating to designing and delivery of e-learning materials.
- Student-centred flexible learning and teacher-centred traditional learning.
- Blended learning approach.
- ICT and pedagogy.
- ICT and attainment.
- Teachers' barriers to ICT use.

The third part of the thesis consists of Chapter 3, which discusses the research methodology. The main topics discussed in this chapter include the following: justification for methodological triangulation; the research design; the sampling design; strategies for data collection; processing and analysing of data; ethical issues; issues of validity and reliability; and limitations of the research methodology.

The fourth part of this thesis consists of Chapter 4, Chapter 5, Chapter 6, Chapter 7 and Chapter 8, which present the findings of the research. Chapter 4 presents the findings on the range of settings in which e-learning materials are used in post-compulsory education and the mode of delivery of e-learning materials used. Chapter 5 provides the findings on the ways in which e-learning materials are used and the implications for the pedagogy of e-learning materials in post-compulsory education. Chapter 6 discusses the findings on the main issues related to the application of e-learning materials used in post-compulsory education. Chapter 7 highlights the findings on the teachers' attitudes and perceptions on the application of ICT and e-learning materials used in post-compulsory education while Chapter 8 presents the findings on the learners' attitudes and perceptions on the application of ICT and e-learning materials used in post-compulsory education.

The final part of this thesis consists of Chapter 9, which presents the summary of Chapter 1 to Chapter 8; the main findings of Chapter 4 to Chapter 8; the overall conclusions; and recommendations, possible contributions and suggestions for future research.

1.6 Originality of the Thesis

The focus of the project was on FE colleges with effective use of ICT. Previous studies by BECTA have covered a sample of colleges without consideration of their expertise in this area. Although this approach was necessary due to the non-participation of some colleges, the result was that, aspects of best practice we identified might otherwise have been missed. Why is this important? Because if best practice is identified, this can be disseminated. Indeed this work has been disseminated at four different international educational conferences (Section 1.1, page 4).

Classroom observations of ICT use involving both students and teachers had not previously been included in studies of ICT use in FE colleges. This provided a particularly powerful way of including the students' and the teachers' reaction to the use of technology, particularly when considered with the students' and the teachers' questionnaires. This vital perspective had been missing from previous studies, yet it is vital to include the views of the end-users in any evaluation of a learning experience. This is important because this is authentic evidence of what actually happens in the classroom and it can be used to evaluate findings of the semi-structured interviews and structured questionnaires which were conducted earlier.

In relation to regional aspect, the FE colleges participated in this research were mainly urban. Previous studies have been relatively wide-ranging, but this in itself is a weakness in that there has been a lack of focus on particular parts of the FE sector. The location of the project in the West Midlands provided an ideal opportunity to focus on the urban and semi-urban FE colleges. These organisations have particular issues

relating to: cultural and ethnic diversity (this might affect their understanding of learning and therefore how ICT can influence this learning); economic status (for example whether they have computers at home, or whether their parents can help them); and English as a second language. The last issue is beyond the scope of this project but would also be worthwhile pursuing in the future as well as adding to the originality of the work. This is important because if we understand how different socio-cultural groups perceive the use of ICT we can consider ways of improving its use and ensure that particular groups are not disadvantaged.

The focus on ICT Managers provided a perspective which, in addition to the student perspective, had not been investigated previously. At the time of the project, the ICT Manager's role was changing from someone primarily involved in the technical aspect of managing IT in the college to someone with responsibility for the pedagogy of ICT use. So their perspective was a vital part of the project and one that had not been a focus of any previous works. This is important because this was a relatively new role and not necessarily understood by the FE colleges or the staff themselves. Unless they understand their role, it cannot be improved and so the use of ICT may not improve. The thesis presented data which has been used (through presentation at international educational conferences) to help ICT Managers understand their role in developing the pedagogy of ICT use.

There had not been a study focusing on e-learning materials in the past. This is important because if we understand the pedagogy of e-learning materials and how they can be used effectively then this will improve learning and provide information to help design better materials. Examples of originality in the research findings are:

- The e-learning materials were mainly used as support and supplementary to traditional teaching and learning methods, not to replace them.

- The extent to which e-learning materials were used on the main curriculum areas depended on:
  - (i) The courses and the subjects offered in each course.
  - (ii) The individual tutors responsible for the specific courses and subjects.
  - (iii) The availability of e-learning materials in the college's departments.
  - (iv) The level of confidence of individual tutors in the college's departments.

- The most commonly used modes of delivery of e-learning materials in FE colleges were CDROMs, Virtual Learning Environments (VLEs), applications software, Intranet, Internet and Videos.

- The e-learning materials were mainly used for the following learning activities:
  - (i) to support and supplement traditional teaching and learning in classrooms.
  - (ii) as learning reinforcement outside classrooms.
  - (iii) for conducting online assessments and quizzes.
  - (iv) for simulation purposes.
  - (v) for research and assignment supports.
  - (vi) for demonstrating skills and for practical skills.
  - (vii) for delivering online materials and information to students.

- The decision to use e-learning materials for any syllabus depends on the tutors; whether this is appropriate or not. In most cases FE colleges always encourage tutors to use e-learning materials in their curriculum areas.

- The tutors used e-learning materials because of the following:
  - (i) the e-learning materials support and enhance traditional methods.
  - (ii) the e-learning materials enable personalisation of learning.
  - (iii) tutors are obliged to by government requirement.
  - (iv) the e-learning materials enable variations in teaching methods.
  - (v) the e-learning materials facilitate inclusivity.
  - (vi) the e-learning materials enable information to be put in different ways.
  - (vii) the e-learning materials motivate and interest students.
  - (viii) the e-learning materials are interactive

- E-learning materials help learners with different learning styles as they allow tutors to accommodate the learning styles of their students.

Chapter 2

Literature Review and Documentary Analysis

2.1 Introduction

The aim of this chapter is to present the published literature related to the areas being researched. A literature review is an important stage in a research work as it provides a means of grounding one's research and explaining its relevance. The literature review presented in this chapter is the result of the reading that has been undertaken when preparing the research proposal; and throughout the whole research process. In making choices about which literature to include, the main considerations were focused on the relevance of particular literature to the area of focus as well as the important functions that the literature review can serve: enable the researcher to identify the information that is useful for the research; enable the researcher to make comparisons with other research and draw together perspectives on themes and topics; enable the researcher to devise conceptual and theoretical frameworks that can be used for the collection and analysis of data by considering how other researchers have focused on an issue; enable the researcher to demonstrate his familiarity with the chosen subject area to be investigated by providing an overview of previous investigations; and helping the researcher to justify the focus of the research and the way it has been carried out.

This chapter is structured as follows: Section 2.2 discusses the role of technology in education and covers important aspects which provide a strong theoretical framework for thinking about the possible synergies between technology and learning. Section 2.3 examines the positive impacts of technology on pedagogy; Section 2.4 discusses the role of technology in the development of thinking in the post-16 education sector while Section 2.5 discusses learning styles theory and its implications for pedagogy. Various definitions of learning styles are included and some popular learning styles' models are highlighted in this section. Apart from that it includes arguments on learning styles and provides some implications for pedagogy. Section 2.6 deliberates on issues relating to designing and delivery of e-learning materials. Section 2.7 examines the differences between student-centred flexible learning and teacher-centred traditional learning environments. Blended learning approach is discussed in Section 2.8. This section offers the arguments to support blended learning, highlights the advantages of such approach and discusses briefly the issues relating to blended learning technology. Section 2.9 reviews the relationship between ICT and pedagogy. This section discusses issues relating to pedagogical reasoning and examines the relationship between attainment and pedagogical practices involving the use of ICT in primary and secondary education. Section 2.10 investigates the effects of ICT on attainment. This section highlights factors affecting attainment and provides research evidence relating to specific curriculum subjects (Mathematics, English and Science). Section 2.11 discusses the teachers' barriers to ICT use while Section 2.12 concludes the overall presentation of Chapter 2.

2.2 Technology in Education

> How people learn, what constitutes effective learning environments, and the role of technology in education provides a strong theoretical framework for thinking about the possible synergies between technology and learning.
>
> (Romeo, 2006: p.160)

On the issue of how people learn, Romeo (2006: p.150) cited Brown *et al.* (1999) who believe that:

> humans are designed to be flexible learners and active agents in acquiring knowledge and skills; learning is a basic, adaptive function of humans; and, much of what people learn occurs without formal instruction.

New information about learning has been generated for the past thirty years and yet there are still currently a lot of scientific works investigating the processes of thinking and learning as well as the development of competence. Romeo (2006) suggested that by using a variety of approaches and techniques, the work of cognitive psychologists, educationists, anthropologists and neuroscientists is beginning to converge and consequently this will lead a situation where we can have a clearer picture as to how people learn. He cited the study of expertise which demonstrates what effective learning looks like and suggests that learning environments should be designed to assist learners to develop meaningful patterns of information; to organise and contextualise their knowledge; and to fluently retrieve and adapt that knowledge.

Romeo (2006: p152) suggested that:

> understanding how learners transfer what has been learned in one situation to new situations is important for educators.

He noted however that there are several factors which influence the successful transfer of knowledge: the extent of mastery of the initial subject matter; the degree to which learners learn with understanding; the amount of time learners are apportioned to learn complex subject matter; the quality of the feedback learners receive; and the learners' level of motivation.

Apart from the above, Romeo (2006) has also identified other factors which influence a learner's ability to transfer knowledge: overly contextualising knowledge; the adoption of an active, metacognitive approach rather than a passive approach to learning; the importance of understanding conceptual change; and building on pre-existing knowledge (including pre-existing cultural knowledge).

It is interesting to note that:

> learners of all ages have many things in common but in many ways children differ from adult learners.
>
> (Romeo, 2006: p.152).

To discuss this issue it would be helpful to look at some relevant theories put forward by Brown *et al.* (1999), Knowles (1984) and Merriam and Caffarella (1991).

Romeo (2006: p.152) cited findings from the studies carried out by Brown *et al.* (1999) on how children learn:

- Children have a strong predisposition to learn rapidly and readily by actively making sense of their world.
- Young children do have strategic and metacognitive competence; they do have knowledge about their own learning and can learn to learn intentionally.
- Young children lack knowledge and experience but they can reason effectively with the knowledge they have. As they mature, they develop theories of what it means to learn and understand.

- Children are problem solvers and problem generators who are self-motivated and self-directed in their learning. Teachers, parents, coaches, and other children play a major role as guides in cultivating their learning, assisting them to make connections and supporting their curiosity and persistence by structuring and supporting learning attempts.

Knowles (1984) clarifies the assumptions of learners in the pedagogical model (how children learn) in comparison with those in the andragogical model (how adults learn). The assumptions of learners in the pedagogical models are:

- The learners are dependent personalities, assigning to the teacher full responsibility for making all the decisions about what should be learned, how and when it should be learned, and whether it has been learned. The only role for the learner is that of submissively carrying out the teacher's directions.
- Learners enter into an educational activity with little experience that is much value as a resource for learning.
- Learners become ready to learn what they are told that they have to learn in order to advance to the next grade level, readiness is largely a function of age.
- Learners enter into an educational activity with a subject-centred orientation to learning.
- Learners are motivated primarily by external pressures; from parents and teachers; competition for grades and the consequences of failure.

The following are the assumptions of learners in the andragogical models:

- Adult learners are self-directing.
- Adult learners enter into an educational activity with both a greater volume and a different quality of experience from youth.

- Adult learners become ready to learn when they experience a need to know or do something in order to perform more effectively in some aspects of their lives.
- Adult learners enter an educational activity with a life-centred, task-centred, or problem-centred orientation to learning.
- Adult learners are motivated primarily by internal motivators which is self-esteem, recognition, better quality of life, greater self-confidence, self-actualisation and some external motivators such as a better job and a salary increase.

Merriam and Caffarella (1991) categorised the learning theories into five schools, each with distinctive perspectives and approaches to learning. The five schools of learning theories are as follows:

- The *cognitivist* believes that humans are capable of insight, perception, and attributing meaning. Learning occurs when humans recognise experiences, thereby making sense of input from the environment.
- The *behaviorist* believes that learning is built on three assumptions; changed behavior indicates learning; learning is determined by elements in the environment; repetition and re-enforcement of learning behaviours assist in the learning process.
- The *humanist* views individuals as seeking self-actualisation through learning, and being capable of determining their own learning.
- The *constructivist* stresses that all knowledge is context bound and that individuals make personal meaning of their learning experiences through

internal construction of reality and emphasises the importance of changing oneself and the environment.

- The *social learning* theorist focuses on the social context in which people learn (eg how they learn through interacting with and observing other people).

There are four basic principles that should be taken into account when teaching for effective learning: learner-centred environments, knowledge-centred environments; assessment-centred environments; and community-centred environments (Romeo, 2006: p.153). According to Romeo, understanding learners and what constitutes effective learning is not enough as the role of teachers in these perspectives is also important. As such effective teachers in the learner-centred, knowledge-centred, assessment-centred and community-centred environments should be able to blend the concepts and enquiry methods of their disciplines into clever instructional designs which will help learners to understand complex ideas.

Brown *et al.* (1999) view the role of ICT in education in the following manner:

- Bringing exciting, real world problems into the classrooms
- Providing scaffolds and tools to enhance learning
- Giving students and teachers more opportunities for feedback, reflection, and revision.
- Building local and global communities
- Expanding opportunities for teachers' learning.

The availability of dynamic multimedia, streamed audio and video, simulations, rich databases, and interactive websites has made it possible now to bring powerful tools, resources, and data to the classrooms. These powerful interactive technologies present learning opportunities that have not been previously available and now make it possible to create effective learning environments. It is also noted that technologies such as calculators, databases, spreadsheets, word processors, multimedia, web authoring, and programming software can serve as scaffolds and tools to assist students' understanding and learning.

According to Romeo (2006: p158), network technologies can also be used to build local and global learning communities. The communication technologies that are now available via the Internet (chat, e-mail, threaded discussion groups, etc.) allow learners to respond to situations and share the responses (Edward and Romeo, 2003) and present unique opportunities to build learning communities. The technology also provides teachers with opportunities to be part of their own local and global learning communities, to use web technologies and various applications to scaffold their learning as well as opportunities to revise, reflect and receive feedbacks (Brown *et al.* 1999).

2.3 The Impact of Technology on Pedagogy

Gregoire *et al.* (1996) argue that new technologies can stimulate the development of intellectual skills; contribute to ways of learning knowledge, skills and attitudes; and generate spontaneous interest more than the traditional approaches. Their analysis of the contributions of new technologies to the teaching and learning process in elementary schools has revealed that students using new technologies concentrate more than

students in traditional settings. They observed that new technologies help spur a research spirit within students and promote collaborative learning. From the study, it was noted that the benefit to students of using the new technologies was greatly dependent on the technological skills of teacher and the teacher's attitude towards using technology in teaching. The researchers argue that these skills and attitude are largely dependent on the training the teaching staff have received in this area. So it is important to ensure that teachers have supportive knowledge, skills and attitudes to enable the benefits accruing to students from appropriate use of technology in the learning process to be achieved.

From the same study, Gregoire *et al.* (1996) reported that new technologies allow teachers to make use of new information sources; facilitate collaboration among teachers and others; and lead teachers to develop lessons with more authentic tasks and collaboration among students. They believe that new technologies if used appropriately will change the teacher's role to guide or mentor, and enable them to interact with students more than in traditional environments. According to the researchers, teachers using new technologies in their work will shift their emphasis on learning to higher-order cognitive skills. It was also reported that new technologies encourage more demanding assessment methods and student self-assessment and facilitate the use of more frequent formative assessments.

Gregoire *et al.* (1996) claim that it is becoming increasingly clear that technology in itself does not directly change teaching or learning. What is important is how technology is incorporated into instruction. While technology on its own may not

improve students' achievement, research is helping us to understand how technology creates circumstances and opportunities which will results in positive effects on student achievement (Honey *et al.* 1999).

Maurer and Davidson (1998: p.309) on the other hand, provide a list of specific changes they believe are related to an increased use of technology: greater individualisation of learning; smoother arrangements of children for group learning experiences; integration of isolated disciplines; a change from predefined credit bearing structured learning units towards authentic learning; a change from discipline-driven environments towards social modeling; and a shift toward more powerful learning strategies.

Means and Olsen (1993: p.14) claim that technology use often stimulates teachers to present more complex tasks and materials; tends to support teachers in becoming coaches rather than dispensers of knowledge; and provides a safe context for teachers to become learners again and to share their ideas about curriculum and method. It is also claimed that technology use can motivate students to attempt harder tasks and be more careful in crafting their work; and adds significance and cultural values to school tasks.

Research evidence suggests that there are multiple pedagogical possibilities inherent in a technology-based student-centred learning environment (Gibson, 2001: p57). Gibson believes that the success of these environments depends on a teacher's ability to recognise that all learners develop a preferred and consistent set of behaviours or approaches to their own learning and have individual needs that can be provided for through mediated, technology-based, student-centred environment. He finds that the model of teaching and learning adopted in any classroom is influenced by the teacher's

conception of learning and claims that a teacher's mental model of what learning is, influences the approaches taken to the design of the learning environment and the types of strategies used.

2.4 Technology and the Development of Thinking in Post-16 Education Sector

The use of technology may serve as a useful motivator in post-16 education sector, as it would offer a different approach from traditional learning environments and provide an opportunity for students to engage actively in the thinking process. Research evidence suggests that technology has the potential to transform many aspects of how learning occurs and how people interact. According to LSRC (2004):

> the term *technology* does not refer to one simple type of technology. It is a broad term often used to refer to a range of electronic materials and/or methods for learning. For example, the use of technology may relate to the use of a computer, video materials, the Internet or a range of multi-media. The computer can be used as a tutor; as a means of promoting the development of thinking via different electronic *mind tools* or as a support for dialogue between learners and or between teachers and learners.
>
> (LSRC, 2004: p.33)

It was felt that greater accessibility to information via technology has called for a need to develop critical thinking (McKnight, 2000). According to her, without the ability to think critically, people would be the victim of modern communication media. Thus technology contributes to the increased need to develop critical thinking as well as providing a way of developing thinking (Mooney *et al.* 1999; McKnight, 2000).

Mooney *et al.* (1999) carried out a study which provide an example of the use of technology to support learning. The purpose of this study was mainly to build a deeper understanding of ideas through participation. According to the authors, a cognitive process model underpins the learning program as it provides an environment to support learning as the active construction of meaning. It was claimed that the program encourages mental activities as well as make use of a range of strategies to promote deep processing of information.

A study conducted by McKnight (2000) provides an example of the use of technology to emphasise the social aspects of learning in the development of critical thinking. It was suggested that online discussion and collaboration can support critical enquiry; offers the potential for collaboration; increased participation in the learning process; involves reflection, peer tutoring, monitoring of student learning; and an extension of classroom learning.

However it was noted from this study that technology is unlikely to encourage and develop collaborative thinking if the students have had no previous experience in collaboration off-line. To overcome this issue it was suggested that the teaching staff should model questioning techniques that enhance social interaction and dialogue (McKnight, 2000). What is important here, this study highlights the point that online collaborative discussions will not automatically promote the development of critical thinking skills if students are: not provided with appropriate support from their tutors; and not given the opportunity to practise thinking skills in other contexts. This study indicates the importance of the students getting support to develop the skills and behaviour to participate in online collaborative learning communities. Apart from that,

the staff also need to develop new teaching approaches in order to support and mediate learning in the new electronic environments. Based on claims made by the above researchers, there is evidence to suggest that interaction with technology offers new possibilities for interdependent, collaborative learning.

2.5 Learning Styles Theory and its Implications for Pedagogy

Learning styles refers to the different ways in which children and adults think and learn. Litzinger and Osif (1993) indicated that there appear to be four basic channels through which people prefer to receive information: visual, auditory, kinaesthetic and social. Learning styles theory suggests that individuals have different ways of learning, and when teaching accommodates these styles, learning is enhanced. Learning styles can be based on different preferences in cognitive information processing (Kolb, 1984), personality or temperament (Keirsey, 1998) and social interaction (Owens and Straton, 1980; Grasha, 1996). Valley (1997) defined learning styles as the preferences that an individual may have for processing information in a particular way when carrying out a learning activity. Matthews, (1996) described learning styles as cognitive, affective and psychological indicators of the manner by which students perceive interact with and respond to the learning environment.

Knowledge and understanding of individual learning styles has been used in many FE colleges for some years to help student retention and achievement. It is argued that if students understand their own learning preferences they are more likely to be successful and therefore will stay in formal learning circumstances longer and achieve their desired outcomes. Woolhouse (2003: p.258) argues that:

> tutors understanding of their own teaching styles and the learning styles of their students can also improve the learning process.

On the other hand, Frank Coffield in his article *Revealing figures behind the styles* which was published in the Times Higher (Jan 2004: p20) stressed that:

> tutors who use some popular learning style models could be wasting their time, the evidence suggests that all are not equal.

He questioned the reliability and validity of the various questionnaires and other learning style instruments which are used to determine the learning styles of the individual students. He and his team selected 13 of the 71 most influential learning styles models for closer study which include: Kolb's (LSI), Honey and Mumford's (LSQ), Dunn and Dunn model, Gregorc's (GSD), Jackson's (LSP), and Herrmann's (HBDI).

Their findings give a mixed message. First, learning styles provide tutors and learners with a language with which to discuss their learning preferences: how people learn or fail to learn; how both parties can facilitate or hinder these processes; and the strengths and weaknesses of the different models and inventories of learning styles. But the idea of a learning cycle; the consistency of visual, auditory and kinesthetic preferences; and the value of matching teaching and learning styles to their mind are all highly questionable.

Secondly, self-assessment of learning styles should be based only on instruments that have been independently validated. Teachers should use them to encourage students and staff to develop their understanding of learning, not only by diagnosing how people

learn but also by showing them how to enhance their learning by adapting styles and approaches that have been demonstrated to be more effective.

More importantly, they found that none of the most popular learning style instruments have been adequately validated through independent research. The quality of the leading models varies noticeably and it matters which instrument tutors choose to use with students. According to them, even some of the best known instruments (commercially successful) have such low reliability and negligible impact on pedagogy that they recommend their use in research and in practice be discontinued.

Coffield *et al.* (2004) however noted that certain models and inventories such as those designed by Entwistle (1998) and Vermunt (1998) can be used to discuss with students (issues on changes in teaching and learning) but they suggested that the models would need to be redesigned and revalidated for use in other post-16 learning contexts.

2.5.1 Learning Style Approaches

One of the most popular learning style theories is the theory advanced by two New York researchers, Rita and Ken Dunn. The Dunn's model is often referred to as the VAK approach, because it focuses on visual, auditory and kinesthetic learning styles. But other researchers also use the VAK approach. Howard Gardner, the author of Multiple Intelligence (MI) identified eight *intelligences* and suggests that they are located in different regions of the brain (Gardner, 1983). According to this theory someone who is *left-brained* is often thought to be logical and structured, while someone who is *right-brained* is more creative and spontaneous. The theory claims that

by identifying these various *intelligences* and teaching to them, teachers can make their lessons more effective.

Riding and Rayner (1998) focus on the different ways in which the brain processes information. They suggest that there are two fundamental types of contrasting learning styles, verbal versus visual and holistic versus analytic, with each individual falling somewhere along the continuum. They describe cognitive styles as an individual's preferred and habitual approach to organising and representing information. Given (1996) points out that when students are taught using their preferred learning styles, they not only increase their academic attainment but also improve their attitude to learning and their behaviour.

2.5.2 Learning Style Models

Honey and Mumford (1986) designed the learning styles questionnaires (LSQ) which can be used to identify an individual's preferred learning styles. They argue that once the learning preferences have been identified learners are in a better position to select learning experiences that suit their style. They categorise learners under four different learning styles: activists, reflectors, theorists and pragmatists.

According to Honey and Mumford (1986) *Activists* involve themselves fully and without bias in new experiences. They are open-minded, not skeptical and this tends to make them enthusiastic about anything new. They tend to act first and consider the consequences afterwards. They tend to do well on the challenge of new experiences but are bored with implementation and longer-term consolidation. They are outgoing

people, constantly involving themselves with others, but in doing so they seek to centre all activities around themselves.

Reflectors on the other hand like to stand back to reflect on experiences and observe them from many different perspectives. Their philosophy is to be cautious. They are thoughtful people who like to consider all possible angles of implications before making a move. They enjoy observing other people in action. When they act it is part of a wide picture which includes the past as well as the present and others' observations as well as their own.

Theorists adapt and integrate observations into complex but logically sound theories. They study different facts into logical and meaningful theories. They like to analyse and synthesise. They are keen on basic assumptions, principles, theories, models and systems thinking. Their philosophy values highly rationality sound logic. They prefer to maximise certainty and feel uncomfortable with subjective judgements, lateral thinking and anything superficial.

As for *pragmatists*, they are keen on trying out ideas, theories and techniques to see if they work in practice. They positively search out new ideas and take the first opportunity to experiment with applications. They like to get on with things and act quickly and confidently on ideas that attract them. They are essentially practical, down to earth people who like making practical decisions and solving problems. They respond to problems and opportunities as a challenge. Their philosophy is *there is always a better way* and *if it (works) it is good.*

Certain models have become extremely influential and popular, one of which is Curry's (1983) model, often referred to as the *onion model*. The onion model in which learning style constructs are organised into three levels which overlie a central personality dimension. The inner layer is made up of cognitive personality elements, the second layer consists of information processing styles, while the outer layer represents learning preferences. According to this model, *the nearer to the surface of the onion the more amenable a construct is to the introspection and internal influence.* In the USA the Dunn and Dunn learning styles model (Dunn, 1984) is used in a large number of elementary schools, while in the UK, both Kolb's Learning Style Inventory (LSI) and Honey and Mumford's Learning Styles Questionnaires (LSQ) are widely known and used.

2.5.3 Arguments on Learning Styles

Coffield *et al.* (2004: p.2) suggest that:

> there is a strong intuitive appeal to the notion that we all have individual preferences and styles of learning.

According to these researchers evidence for the idea that we have individual learning styles appears to be offered when teachers notice that students vary tremendously in the speed and manner with which they pick up new information and ideas and the confidence with which they process and use them. They found that other theorists promote the idea of learning styles instruments as diagnostic assessment tool that encourages a more self-aware reflection on one's strengths and weaknesses. They argue

that for supporters of this idea, the notion of learning styles offers a way for teachers and students to talk more productively about learning using a more focused vocabulary.

In contrast, other theorists argue that it is more productive to look at the context specific and situated nature of learning and the idea of learning biographies rather than styles or approaches. Those who reject the idea of measurable learning styles consider it more useful to focus on learner's previous experience and motivation. Although many theorists draw logical conclusions about practice from their models of learning styles, Coffield *et al.* (2004: p.4) claim that:

> there is a lack of well-conducted experimental studies of alternative approaches derived from particular models.

They argue that most of the empirical studies have been conducted on university students in department of psychology or business studies as such some would criticise these as studies of captive and perhaps a typical subjects presented with contrived tasks. On the other hand Robert and Newton (2001) argue that learning is so complex that is unlikely to be captured by any set of learning styles dichotomies.

Coffield *et al.* (2004: p.40) cited Hayes and Allinson (1996) who argue that:

> even if matching teaching to learning styles improves performance, it will do nothing to help prepare the learners for subsequent learning tasks where the activity does not match the individual's preferred style.

It was found that the review made by Coffield *et al.* (2004) has failed to find substantial, uncontested and hard empirical evidence that matching the styles of learner and tutor improves the attainment of the learner significantly.

There clearly are differences in the ways in which people learn, their biological and socio-cultural background to name a few. We cannot ignore the socio-economic, cultural and even geographic context of the learner. The learning style model of Dunn (1984), and Reichmann and Grasha (1974) for example included preferences for social interactions in specific learning environments and included attitudes towards learning, the views of teachers and peers, reactions to classroom procedures, and even physiological stimuli.

One of the principal objections to learning styles put forward by Reynolds (1997) is that the theorists have failed to take into account the social context within which learning takes place. He argues that those theorists who tend to favour the idea that learning styles are fixed rather than flexible should acknowledge that the styles of the teachers may also be resistant to change and that the styles adapted by powerful figures at work may be shaped by social, cultural and political factors which go beyond individual differences. Sadler-Smith (2001) on the other hand concludes that no one factor, psychological, environmental or social that can be considered to be the sole cause of human behaviour.

2.5.4 Implications for Pedagogy

Learning styles can serve as a platform for learners to discuss their own learning preferences and those of others; how people learn and fail to learn; and how teachers can facilitate or hinder these processes. Through dialogue with a tutor knowledgeable about the relevant literature, the students' range of learning styles can be enhanced in

the hope of raising their expectations and aspirations. In relation to the above issue Coffield *et al.* (2004) believe that:

> knowledge of learning styles can be used to increase the self-awareness of students and tutors about their strengths and weaknesses as learners. In other words, all the advantages claimed for metacognition can be gained by encouraging all learners to become knowledgeable about their own learning and that of others.
>
> Coffield *et al.* (2004: p.37)

According to Sadler-Smith (2001: p.300):

> the potential of such awareness lies in enabling individuals to see and to question their long-held habitual behaviors; individuals can be taught to monitor their selection and use of various learning styles and strategies.

One of the most popular recommendations is that the learning styles of students should be linked to the teaching style of their tutor, the so-called matching hypothesis. On this issue Ford and Chen (2001) concluded that matching was linked with improved performance. Roberts and Newton (2001) on the other hand argue that learning is so complex that it is unlikely to be captured by any set of learning style dichotomies.

Grasha (1984) stresses that people need to be *stretched* to learn and stretching may mean deliberately creating a mismatch between their learning style and the teaching methods. This argument was supported by Gregorc's (1984) on the basis that even those individuals with strong preferences for particular learning styles preferred a variety of teaching approaches to avoid boredom. Kolb (1984) pointed out that the main educational objectives of mismatching are personal growth and creativity of the learners themselves. Ford and Chen (2001) provide evidence to show that matching and mismatching can have significant effects upon learning outcomes. So it is the

responsibility of teachers, tutors and managers to adapt their teaching styles to accommodate the learning styles of their students or staff members.

2.6 Issues Relating to Designing and Delivery of E-learning Materials

With regards to the issues relating to designing and delivery of e-learning materials, Sadler-Smith and Smith (2004: p.395) view that:

> developments in the technologies available for the design and delivery of workplace learning programs, together with the increasingly diverse learning needs of organisations, have encouraged a stronger focus on learning design and delivery which is more closely aligned to learner's requirements and contexts.

He notes that the conventional approaches to a program's design for workforce learning and development have sometimes been typically based upon instructional design strategies. In this approach the implicit assumption is that the target group of learners will display uniformity in the ways in which they process and organise information and in their tendency towards specific learning situations and media. This approach will however neglect the important aspects of individual differences in cognitive style and instructional preferences. Adopting to this approach may mean that, the ways in which individuals may adapt to the demands of specific learning situations (through the use of learning strategies) may also be overlooked in the design and implementation of learning.

There has been a considerable growth in the use of flexible forms of delivery for workplace learning and development (Calder and McCollum, 1998). The growth in flexible delivery has been triggered by rapid and ongoing developments in computing

and information technology. This in turn has resulted to e-learning been widely recognised as a valuable and valid medium for the delivery of flexible learning. An assumption of a flexible learning philosophy as defined by Sadler-Smith and Smith (2004: p.396) is that:

> modes of delivery such as distance learning, programmed instruction, technology based training, telematics and e-learning enable learners to acquire job-related knowledge and skills at a time, place and pace that is commensurate with their own particular circumstances.

The issue of design flexibility in relation to learner's need has been addressed by a number of researchers. In relation to this, Nikolova and Collis (1998) discussed the problems of designing flexible instruction from the designer's and the learner's perspective, arguing that telematics plays an important role in providing flexibility. In relation to meeting learner's need, the learning style approach is important in this aspect as it was regarded as one way of addressing the issue of design flexibility.

Sadler-Smith and Smith (2004: p.395) offer three strategies for accommodating individuals' styles and preferences in flexible learning programs:

- Consider some aspects of individual difference that are pertinent to the delivery of flexible learning in the workplace.
- Identify some of the challenges that differences in styles and preferences between individuals may raise for instructional designers and facilitators.
- Suggest ways in which models of flexible learning design and delivery may acknowledge and accommodate individual differences in styles and preferences through the use of an appropriate range of instructional design, learning and support strategies.

Sadler-Smith and Smith (2004) agree with Hughes and Hay (2001) that the different perspectives of each of the stakeholders in the development of learning materials needs to be integral to the instructional design process. Ebersole (1997) on the other hand describes designing effective interactive media as an intimidating proposition and explained that in addition to the collection and organisation of useful content, the designer of Computer Aided Learning (CAL) materials must create a user interface that facilitates access to the content.

Atkinson (2004, p.661) suggests that:

> in a traditional teaching situation, the teacher is able to monitor a pupil's learning as an ongoing process. The teacher can adjust teaching strategies on an individual pupil basis if it becomes evident that understanding of the content has not been achieved.
>
> She observes that the form of the changes will generally arise out of the teacher's ability to read the situation; knowledge of the learner; and portfolio of personal teaching strategies. And hence combinations of these factors will enable a teacher to provide appropriate actions for the individual learner in any given situation.

In today's computer environments however, it is mainly the learners who must take on this responsibility (Steuer, 1992). They must decide how best to work their way through the materials provided. It has been noted that for many learners this has been shown to be problematic (Ebersole, 1997; Recker, 1995) simply because learners were sometimes found to be unable to acquire the complex structure of the learning materials provided for them (Shum, 1990) and to map it on their own learning styles (Alexander, 1995). It would therefore seem important that all learning materials, whether for traditional or

CAL environments, should be cognitively well designed, so that such problems could be reduced if not totally eliminated.

2.7 Student-centred Flexible Learning and Teacher-centred Traditional Learning

The terms student-centred and teacher-centred appear to be largely defined in terms of the types of instructional strategies that are representative of them (McAlpine and Gandell, 2003). The main focus of this section will be to examine the characteristics or features inherent in the student-centred flexible learning and that of teacher-centred traditional learning environments. This section will also discuss the advantages of adopting the student-centred/learner-centred approach as well as identifying factors or criteria that might influence its aim to be an effective learning environment.

2.7.1 Student-centred Flexible Learning

Student-centred flexible learning is where learners have some control of the time, place, pace and processes of their study (Race, 1998). SLICE (2002) describes student-centred flexible learning as a situation where teachers occasionally replace traditional lectures with activities or materials and aim to provide some flexibility in terms of the place, pace, time and content of student learning. Examples of such learning activities include the integration into teaching programmes of self-learning packages, self-guided field trips, e-learning packages, student-led projects, seminars, and coursework assignments.

Malcom and Zukas (2001) believe that the educational policy and practice in the UK in recent years have been characterised by a marked shift towards *learner-centred* approaches. This is evident in all sectors from pre-school to higher education, and focusing on the individual learner has become a tacit or explicit requirement for *good practice* in teaching. Peter (2000) on the other hand, suggests that in future there will be greater emphasis on students learning independently and autonomously. Scott (2002) argues that for student-centred learning to be effective, students need to be supported to become self-organised and autonomous learners. In addition, staff need to be supported to become reflective practitioners, prepared to research and evaluate their own practice. The other important aspect is the culture of openness, where tstaff are encouraged to disseminate their findings, to share their experience, their successes and failures.

2.7.2 Advantages of Student-centred Flexible Learning

One of the many advantages of student-centred flexible learning could be seen as per argument put forward by Race (1998: p.18), who points out that:

> if students get things wrong while working on student-centred learning materials, their mistakes are private, not public.

> good learning materials can help build up a student's confidence due to its supportive nature, particularly as good learning materials necessarily integrates readily available and supportive feedback for students.

He goes further suggesting that introducing student-centred techniques can free up staff time to reinforce this feedback loop. According to this researcher, flexibility would enable students who get tired, taxed or even bored with learning materials to put it aside

for a while; and at the same time it provides opportunities for off-campus learning among the part-time students.

The other advantage of student-centred flexible learning is related to the two components which exist in this approach: high levels of activity (to engage learners) and effective, accessible feedback (to reinforce learning) (SLICE, 2002). Active learning is beneficial because it enables learners to interact directly and reflect more deeply upon their learning experiences than they would with passive, traditional methods of delivery like formal lectures (Morton, 1975; Lammers and Murphy, 2002).

Employers could also benefit from a shift to more student-centred approaches in universities as students with more flexibility become more engaged, develop more autonomy and thus develop improved lifelong learning skills, which should be of benefit to industry (Anderson and Spalding, 1996).

2.7.3 Teacher-Centred Traditional Learning

Teacher-centred traditional learning is described as a focus on knowledge transmission with the student as passive recipient; the lecturer supplying notes and handouts; and where the goal is to cover the syllabus. Kember and Kwan (2000) view teacher-centred traditional learning as an environment where there are frequent tests and quizzes which may not be as supportive of higher order learning as a student-centred approach.

Goodland (1984), Knapp and Glenn (1996) observe that most teachers use a variation of the teacher-centred model of instruction, where the emphasis is upon the presentation of a body of knowledge or a set of skills that students are to learn. As far as the teachers

are concerned, this style of teaching is predictable, comfortable and controllable where the focus of power in the classrooms remains with the teacher, which provides them with almost total control of the process and the unrestrained ability to plan, to test, and to cover the set materials. In the teacher-centred traditional approach, learning is viewed as the transfer of thoughts from one who is knowledgeable to one who is not, and where the work of the teacher is perceived as direct instruction (Dwyer, 1996).

In traditional, instruction-based classrooms, activity is the teacher's domain while students are generally passive listeners following carefully sequenced instructions. Gibson (2001: p.42) on the other hand views teacher-centred traditional learning as an environment where:

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

2.8 Blended Learning Approach

Blended learning is increasingly gaining popularity as an effective pedagogical approach that integrates classroom and technology-enhanced learning. The collaboration for Online Higher Education Research consortium defines blended learning as:

> the best of both worlds, from the integration of online and face-to-face teaching, resulting in an enhanced learning experience.
>
> (Matheos *et al.*, 2005: p.57)

In relation to blended learning approach, Stubbs *et al.* (2006: p.163) observe that:

> the term blended learning has been adopted widely to describe combinations of face-to-face and technology-based learning

2.8.1 Arguments to Support Blended Learning

Garrison (2003) contends that blended learning combines the strengths of face-to-face and online educational experiences to provide unique inquiry-based learning. O'Toole and Absalom (2003) on the other hand argue that simple substitution of face-to-face for technology-based learning is unlikely to be successful. On this issue, they call for designers to integrate communication channels on the basis of their relative merits and collective abilities to reinforce progress towards intended learning outcomes.

Kerres and Witt (2003) offer a 3C-conceptual framework that calls for blended learning designers to consider the content of learning materials; the communication between learners and tutors and between learners and their peers; and the construction of the learners' sense of place and direction within the activities that denote the learning landscape. Graff (2003) looks across these three dimensions (content, communication and construction), exploring relationships between the learner's cognitive styles and the sense of classroom community caused by a blended learning environment; and concludes that designs must be sensitive to the needs of learners as individuals.

Corporate researchers and practitioners note that technology enhanced learning alone was not enough, arguing further that people needed experiential learning for the mastery and retention of knowledge and skills achieved through the blending of technology and face-to-face interaction (Singh, 2003; Collis, 2002). Collis and Winnips (2002) explore different pedagogical scenarios that can be embedded into web-based learning environments and traditional learning situations to produce productive and reusable learning outcomes. McCracken and Dobson (2003) on the other hand, have proposed a body of principles for blended learning design through the exploration of issues relating

to teaching and learning, organisational factors, discipline specific factors and learning technologies.

2.8.2 Advantages of Blended Learning

In the educational context, the use of blended learning strategies provides instructors and courseware designers with the skills and knowledge necessary to fully function in technology enhanced learning environments. Driscoll (2002) notes that blended learning by its very nature can allow teachers and learners to move from the traditional classroom to e-learning in small steps, allowing for the inclusion of aspects of both face-to-face and online learning. The blending of technologies affords greater flexibility in teaching and learning and enables the delivery of high quality content and effective learning. Blending different technologies can also encourage wider and faster access to learning materials provided by instructors and peers, whereas in a traditional classroom, instructor or peer support can only be obtained within a specific context.

Matheos *et al.* (2005) argue that an inclusion of technology-enhanced learning within a blended learning environment can allow students to access support at any time and anywhere. Marsh (2002) suggests that blended learning can also incorporate the social benefits of the classroom for learning activities which require a face-to-face interaction with online self-individualised context. In this aspect, individualisation of instruction can be achieved through an understanding of individual learning preferences and how learners chose technology to enhance their learning. It was also noted that blended learning made it possible to blend independent learning with collaborative learning approaches to improve learning outcomes by incorporating various technologies.

2.8.3 Issues Relating to Blended Learning Approach

Daniel *et al.* (2004) note that despite the numerous apparent advantages to learners, little is known about the experiences of learners and what they consider a truly effective blended learning environment. They believe that an effective blended learning approach should begin with: understanding the requirements for blended learning; the learner's preferences; available tools; choice of tools to support the blend; and the available learning support to supplement the blending process. A case study by the above researchers is used to develop a better understanding of the different dimensions of blended learning technology from the learners' perspective, to attempt to provide an explicit definition and to be able to categorise the dimensions of blended learning. In this study, they examine the circumstances, in which learners select their preferences for human and technological support; the instructor's preferences; and the experiences of the learners and the instructors in the integration of technology (Matheos *et al.* 2005).

The result from their study shows that students would respond differently to learning depending on the nature of materials to be learned and the type of human and technological support available. The researchers observed that independent learners are more likely to use more technology support compared to collaborative learners. On the other hand, collaborative learners enjoyed learning and interacting with their peers and instructor and noted that working in groups was essential to increasing their understanding of the domain. The collaboration with colleagues enabled them to exchange experiences and jointly solve difficult problems that they would not have otherwise solved individually. It was also revealed from this study that, domain issues are important to students when it comes to the choice of technology.

2.9 ICT and Pedagogy

The conceptions of pedagogy held by researchers and academics have become more complex over time as our growing knowledge has become both more differentiated and more integrated (Watkins and Mortimore, 1999). They observe that recent developments in our understanding of cognition and meta-cognition have influenced the conceptualisation of pedagogy, and hence describe the current model of pedagogy as a complex one.

Teaching methods and pupil organisation are the two aspects of pedagogy, as outlined by Alexander (1992) in his Conceptual Framework for Educational Practice, where pedagogy is one of the seven inter-related aspects of educational practice. This conceptual framework implies that the pedagogy of ICT should be clarified within a broad framework of educational practice; and what can be observed in the classroom is only part of educational practice. It was suggested that to illuminate good practice in teaching and learning with ICT will require examining teachers' ideas, values and beliefs and the thinking that leads to observable elements in practice (Becta, 2004).

Becta (2005) outlined the ten core principles which express the underpinning values that can be applied to a range of expressions of e-learning and which are particularly useful to designers, teachers and learners. These principles are known as the Ten Pedagogic Principles for E-learning. In relation to these principles, Anderson and McCormick (2005: p.1) suggested that:

> there is an implicit assumption in this principled approach that the more of the principles that are embodied, the better the quality of the pedagogy; and the lower the quality, the fewer.

According to these authors, the principles should be able to help designers to engage in the process of constructing e-learning materials and related activities in a way that will represent sound principles of pedagogy. Apart from that, the principles should also be able to help teachers in the process of choosing resources; designing teaching and learning activities that use them (resources); and supporting such activity while it takes place. The Ten Pedagogic Principles for E-learning as highlighted by Anderson and McCormick (2005) are as follows:

- **Principle 1: Match to the curriculum**
  The pedagogy should be matched with and aligned to the appropriate curriculum through clear objectives; the relevance of content covered; the appropriateness of student activities; and the nature of the assessment.

- **Principle 2: Inclusion**
  The pedagogy should support inclusive practice seen in terms of different types and range of achievement; physical disabilities that can be particularly supported by e-learning; different social and ethnic groups; and gender.

- **Principle 3: Learner engagement**
  The pedagogy should engage and motivate learners. This engagement should be evident in an ethos of being educational and motivating.

- **Principle 4: Innovative approaches**
  It should be evident why learning technologies are being used, rather than a non-technological approach which achieves the same end as effectively. E-learning should be fit for purpose.

- **Principle 5: Effective learning**
  This principle can be demonstrated in variety of ways for example by providing empirical evidence of effective outcomes of the pedagogic approach or by providing authentic learning.

- **Principle 6: Formative assessment**
  The pedagogy should provide formative assessments.

- **Principle 7: Summative assessment**
  The summative assessments must be valid and reliable; comprehensible by teachers, learners and parents; able to deal with a range of achievement levels; and free from adverse emotional impact on the learner.

- **Principle 8: Coherence, consistency and transparency**
  The pedagogy must be internally coherent and consistent in the way the objectives, content, student activity and assessment match to each other. It must be open and accessible in its design.

- **Principle 9: Ease of use**
  E-learning should be transparent in its ease of use.

- **Principle 10: Cost-effectiveness**
  Technology solutions need to be justifiable, affordable and the costs sustainable.

2.9.1 Pedagogical Reasoning

Shulman's (1987) model of pedagogical reasoning described the processes of planning, teaching, assessing and evaluating; and the knowledge needed for these processes. In his model of pedagogical reasoning, Shulman focuses on knowledge rather than ideas and beliefs. In contrast to this belief, Moseley *et al.* (1999) argue that there is evidence to show that teachers' ideas, beliefs and values may also influence practice. As such both facets need to be considered. The implication from this model (teachers' use of ICT) is that teachers need to have sufficient knowledge about the topic or subject for them to make appropriate decisions about using ICT with their pupils.

Alexander (1992) suggests that in the UK we have focused more on content rather than pedagogy, which he argues should not be the case since content and pedagogy are indissolubly linked. In order to explore this link, we can study Shulman's (1987) model of pedagogical reasoning which focuses on the processes involved in teaching (including the transformation of knowledge and how it can be taught) and the issue of

pedagogical content knowledge. Since pedagogical content knowledge differs between subjects, the choice and use of ICT resources will differ in terms of pedagogical practices for different subject teachers. According to Becta (2004: p.16):

> in some situations teachers may use their beliefs to filter their knowledge bases at the start, so that during the processes of pedagogical reasoning they are only drawing on a limited subset of the knowledge base.

2.9.2 The Relationship between Attainment and Pedagogical Practices of Using ICT in Primary and Secondary Education

There is some evidence that ICT helps primary school teachers to be more effective in their teaching (Becta 2003) especially if they are well resourced (Becta 2001). In addition the Becta (2003) report concludes that there are strong links between good use of ICT resources and attainment in ICT and other subjects. Although this is a statistically significant relationship, there are however no proven casual links; as the results may well be due to other factors such as good leadership and general quality of teaching.

Most of the research which investigates the relationship between attainment and pedagogical practices involving the uses of ICT in primary education has been in Science, Mathematics and English. In spite of the limited ICT access, there are positive results reported in many of the focused research studies of using ICT (Barker and Pearce, 1995; Mumtaz and Hammond, 2002; Christmann *et al.* 1997). In this way ICT has becoming a new source for primary school teachers to teach as well as provide them with opportunities to adapt to new ways of teaching Mathematics, Science, English and other subjects.

It was felt that for teachers to benefit from the outcome of using ICT in primary schools, they need to have a detailed knowledge and expertise of the ICT media, the representations of knowledge which these can display, and the ways in which ICT use might change their pedagogies. And hence further substantial training is required for the majority of primary school teachers (how to use a whole range of ICT resource and how to adopt new methods of teaching) without discarding their best pedagogical practices in the use of more traditional methods, which might be used alongside new technologies.

Watson (1993) and Cox *et al.* (2004) observe that two of the fundamental differences between primary and secondary schools are the allocation of ICT resources and the cross-circular nature of primary education compared with the subject-specific teaching and organisation in secondary schools. The normal scenario in many primary schools is that they have a small number of computers and perhaps an electronic whiteboard in each classroom, with teachers using ICT in some subjects. This is very different to secondary schools where the majority of them have networked rooms, and some have ICT departments, and ICT is taught as a discrete subject. It was noted that in secondary schools there is more focus on ICT within subjects, although the demands of the teachers who are responsible for teaching ICT often limit other teachers' access to the technology (Beauchamp 2003). Becta (2004) revealed that some practices which exist in secondary school can also be found in the primary school, although the way the ICT resources were distributed affected secondary teachers' practices differently from primary teachers. Becta (2004: p.84) ends this section with the following:

> evidence from the literature review shows a strong relationship between the ways in which ICT has been used and the resulting attainment outcomes. This suggests that the crucial components in the use of ICT within education are the

> teachers and their pedagogical approaches. Excellent software, reliable hardware and resilient networks, important though they may be, will have no effect on attainment if teachers are not enabled and educated to use these resources appropriately.

2.10 ICT and Attainment

Based on evidence from published research literature, Becta (2004) investigate the effects of ICT on attainment. The evidence from the literature shows a positive effect of specific uses of ICT on pupils' attainment in almost all the national curriculum subjects of which the most substantial positive effects were found in Mathematics, Science, and English (at all key stages). The results from this investigation have shown that:

> the positive impact on attainment is greatest for those ICT resources, which have been embedded in some teachers' practices for a long time.
>
> (Becta 2004: p.5)

From the same investigation, there is also substantial evidence of the contribution of specific uses of ICT to pupils' learning. These include the use of simulations and modeling in Science, ICT and Mathematics, and the use of Word Processing in English. Many studies (Allen and Thompson, 1995; Taylor *et al.* 1997) have also reported on improvement of pupils' motivation and attitudes to learning, shown through improved commitment to the learning task; greater interest in the subject; and pupils taking more responsibility for their learning and making sustained effects in difficult tasks.

2.10.1 Factors Affecting Attainment

Becta (2004) identified many factors, which affect a student's attainment in the primary and secondary education. The most important factors that affect attainment are: the teacher's pedagogies; the use of ICT in different school settings; the use of ICT in informal settings; ages of the pupil; and social cultural backgrounds of the students. According to the researchers, teachers' pedagogies have a large impact on pupils' attainment as they influence the selection of the ICT resources; the preparation of the lessons; the way the ICT resource is used with pupils in lessons; the level of guidance and intervention; and the level of ICT integration within the teachers' subject. Many of the studies show that insufficient understanding of the scope of an ICT resource leads to inappropriate or superficial use in the curriculum.

The main factors affecting the differing impact of ICT on pupils of different ages were: the different levels of access to ICT between primary and secondary pupils; the inappropriate use of ICT resource among of different ages (in relation to the scope for ICT use); and the abilities of the pupils. However there was no reliable evidence that the use of ICT had a greater impact on any particular age group of pupils. Similarly, there was no clear evidence of the affect of any inequality of access on pupils' attainment.

It was noted from this investigation that:

specific uses of ICT can have had a positive impact on pupils' learning, where the use is closely related to learning objectives and where the choice of how the use of ICT is relevant to the teaching and learning purposes.

(Becta, 2004: p.8)

Another important aspect to be considered is that the methods used to measure attainment need to be related to the learning experience that would be promoted by the type of ICT use. It was also suggested that researchers should take into account of ICT leading to new form of knowledge and knowledge representations, that may lead to new types of achievement.

2.10.2 Research Evidence Relating to Specific Curriculum Subjects (Mathematics, English and Science)

Ruthven and Hennessy (2002) study the integration of computer use into mainstream teaching practices and teachers' thinking to analyse the successful use of computer-based tools and resources to support the teaching and learning of Mathematics. They found that the level of use and integration of ICT into Mathematics teaching varied among teachers and that the majority was not using ICT frequently as an integral part of their curriculum.

According to Becta (2004: p.21):

> the research evidence shows that ICT can have positive effects on pupils' learning different concepts and skills in Mathematics at both primary and secondary levels. These effects are most evident through measures which take account of the specific skills and tasks involved.

Evidence from the same study also shows that learning and attainment is closely related to: the learning context; the role of the teacher; and the regular integrated use of the ICT application in the curriculum (Becta, 2004).

Apart from Mathematics, there is evidence to show that different uses of ICT have contributed to some improvements in achievement in English. Word Processing has been widely used in the research projects, although other English specific software is also used. There are interesting results, which show both positive and negative effects of Word Processing, in terms of its contribution to improve students' achievement in English. The study carried out by Barker and Pearce (1995) for example, found that undergraduates made fewer punctuation errors but more passive constructions. In contrast, Mumtaz and Hammond (2002) found that Word Processing was not fully embedded in the English curriculum, and that it was often used superficially with pupils who have little opportunity for drafting and redrafting through which the most positive effects have been identified. According to these researchers the most positive evidence came from the primary pupils' use (those at the early stages of language development) mainly because they have a chance to compose and reflect on their compositions.

Allen and Thompson (1995) study the use of Word Processing in a networked learning environment, to find out real evidence that relates to writing. It was observed that the project reported significant improvement in writing, although some of the measures used may relate to text production rather than writing in a holistic sense, as it would be understood by a teacher of English. The researchers have also reported greater engagement in writing on the part of males in the networked group compared to those in the control group.

During the early years of ICT use, Science classes were the centres of various innovations. Brna (1990 and 1991) used modeling to build an understanding of students' misconceptions, and it has been shown to enhance students' cognitive skills

(Taylor *et al.* 1997). Gilbert and Watts (1983), Dreyfus *et al.* (1998) and Cookson (2001) on the other hand view ICT use as a facilitator of learning instead of a central component of what is happening in the classrooms.

Some recent studies in Science (Christmann *et al.* 1997; Becta, 2004) have suggested that high levels of ICT use may be linked to improved attainment. A significant use of ICT in Science education is the use of specific simulations into the existing curriculum. Studies have also shown the value of simulations, which enable students to visualise and hence help them to solve problems. One of the studies carried out by Monoghan and Clement (1999) found that interaction with a computer simulation online could help a student make appropriate mental simulations offline in related target problems. Becta (2004: p.27) conclude that:

> experimental studies show that the integration of simulations within existing curricula does improve student's understanding at both primary and secondary levels, possibly by: providing experiences producing dissonance/cognitive conflict; creating frameworks for visualization; and providing a focus for discussion, comparing results and exchanging ideas.

The researchers suggest that the simulations can be integrated into the existing curriculum and combined with laboratory experiments, theoretical instruction and in some cases exploration of physical models and assert that where the design or selection of the software focuses on students' alternative conceptions, its use may be particularly beneficial.

From the evidence above, it has been proven that ICT has had a positive effect on many areas of Science attainment. The types of ICT use in teaching Science are much more closely related to specific concepts and skills; ICT use tends to be more subject specific

than the use of Word Processing in English. Becta (2004) found that there is evidence of a positive effect of specific ICT uses on pupils at all key stages (in relation to their conceptual development in Science and the types of learning environment available to them) and further observed that where ICT has been appropriately integrated in the Science curriculum, there is evidence that it has enhanced the learning of the pupils.

2.11 Teachers' Barriers to ICT Use

This section will discuss the main barriers that exist in schools which prevent teachers from making full use of ICT in their work. Based on evidence from the published literatures, Becta (2004) identify seven main barriers to the uptake of ICT by teachers in the classrooms: the lack of teachers' confidence and teachers' computer anxiety; the lack of teachers' competence; the lack of access to resources; the lack of time; technical-related problems (fear of things going wrong and lack of technical support); the resistance to change and negative attitudes; and no perception of benefits issue. By acknowledging such barriers do exist, it helps us to understand the teachers' view about finding it difficult to integrate ICT into their work.

The first barrier to ICT use is the lack of teachers' confidence and teachers' computer anxiety. Larner and Timberlake (1995) found that teachers were worried about showing their pupils that they did not know how to use the equipment, and that it was the teachers who experienced this kind of anxiety who were less willing to make use of computers in their teaching. On the other hand Guha (2000) observes that students are increasingly placing demands on teachers and expecting them to be knowledgeable in the area of computer usage.

Much of the research evidence suggested that the issue of lack of confidence is indeed a major barrier to the uptake of ICT by teachers in the classroom (Becta 2004). Bosley and Moon (2003) as for example, found inconsistencies between the amount of ICT training received by a teacher and the extent to which the teacher applied that training in the classroom. The finding suggests that some staff did not have the confidence to put their learning into practice and the reasons for that (lack of confidence) were mainly due to fear of admitting to their pupils that they had limited knowledge in the area of ICT. Bradley and Russell (1997) reported that the most common causes of this computer anxiety were getting stuck and not knowing what to do next and not understanding the computer jargon and the messages it gives.

Fabry and Higgs (1997) suggest that the issue of computer anxiety among teachers could be linked to fear of losing their professional status as they see the increasing use of computers in teaching as removing or downgrading their traditional pedagogical skills. Becta (2004) suggest that the problem of lack of confidence as the teachers' barrier to ICT use is closely related to several other key issues: the amount of personal access to ICT they have at home; the frequency of technical problems that occur in school; the lack of teachers' competence or teachers' perceptions of their competence; and the quality of the training they received.

The second barrier to ICT use is the lack of teachers' competence, a factor which is directly related to teacher confidence levels. In order to achieve high levels of teacher competence in ICT there is a need to provide training. Kirkwood *et al.* (2000) claim that there is a lot of literature evidence to suggest that effective training is crucial if teachers are to implement ICT effectively in their teaching. It was argued that inadequate or

inappropriate training would prevent teachers from being sufficiently prepared to make full use of technology in and out of the classrooms. Becta (2004) listed the factors that need to be considered in ensuring effective training among teachers: lack of time for training; lack of pedagogical training; lack of skills training; and lack of ICT focus in initial teacher training.

The third barrier to ICT use is the lack of access to resources. Mumtaz (2000) points out that evidence of very good practice in the use of ICT is invariably found in those schools that also have high quality ICT resources and that a lack of computers and software can seriously limit what teachers can do in the classroom with regard to the implementation of ICT.

Becta (2003) on the other hand explored the relationship between a school's use of ICT and its pupils' achievements in national tests. Findings from the study show that those schools, which were well resourced in ICT, tended to have better achievements than schools with unsatisfactory levels of ICT.

It was argued that:

> the lack of good ICT resources in a school will not only prevent teachers from making good use of ICT in their teaching but it is also likely to have a detrimental effect on pupils' achievement.
>
> (Becta 2004: p.11)

The lack of access to resources can be further divided into five categories: lack of hardware; poor organisation of resources; poor quality hardware; inappropriate software; and lack of personal access for teachers (Becta, 2004).

The fourth barrier to ICT use is the lack of time. Fabry and Higgs (1997) point out that learning new skills in any profession requires time but teachers have little time left after spending most of their day teaching and other commitments such as liasing with parents and attending staff meetings, and yet they do need that time to experiment with the technology, share their experiences with colleagues, and attend technology related in-service training programs.

Quite similar to the above, Manternach-Wigans *et al.* (1999) teachers are very concerned about the lack of time for technology as they need more time to learn computer basics, plan how to integrate technology into their lessons and actually use the technology in the classroom.

Preston *et al.* (2000) brought out the issue of teachers suggesting that a great deal of work is required in preparing accurate ICT materials for use by children with a range of abilities, and they (the teachers) complained of the lack of time restricting them from exploring materials for potential use with ICT. Deliberating on the same issue, Cuban *et al.* (2001) noted that there was not enough time for computers to be incorporated fully into daily teaching as teachers need hours to preview websites, prepare multimedia materials for lessons and to undertake training.

A significant number of respondents to the Becta (2004) survey have also identified time as a barrier to their use of ICT: the time needed to locate internet advice; time needed for preparation of lessons and resources; time needed to explore and practice using the technology; time needed to deal with technical problems; and time needed to receive adequate training.

The fifth barrier to ICT use is one which is related to technical problems. This barrier can be broadly split into two main areas: fear of things going wrong and lack of technical support. Bradley and Russell (1997) note that a primary source of computer anxiety is the concern teachers have about damaging a computer's hardware or information base.

According to these researchers this anxiety is likely to prevent teachers from attempting to use the technology at all, even before there is a chance for any potential technical problems to occur. However once the breakdowns do occur, a lack of technical support may mean that the equipment remains out of use for a longer period of time. Becta (2004: p16) indicate that:

> there is a close relationship between these two technical problems: the more frequently that actual breakdowns occur, perhaps due to the lack of preventative technical maintenance, the more likely teachers are to avoid using the technology in the first place.

Quite similar to the above findings, Snoeyink and Ertmer (2001) found that teachers who tried to carry out a task on a computer but who were unsuccessful due to technical problems would then avoid using the computer for several days.

The sixth barrier to ICT use is the resistance to change and negative attitudes. Albaugh (1997) explains that teachers are often suspicious of new claims and the implementation of new ideas without proof of effectiveness and tend to adopt a new technology when that technology helps them to do what they are currently doing better.

Veen (1993) on the other hand notes that:teachers hold views that persist during the introduction of new innovations, and connected this to slow processes of educational changes in schools as teachers needing time to gain experience with computers.

Ertmer (1999) discusses the importance of overcoming problems caused by teachers' beliefs and attitudes concerning ICT (second-order barriers) before other external factors (first-order barriers) are tackled. Mumtaz (2000) suggests that teachers' beliefs about teaching and learning with ICT are central to integration. Dawes (2000) is critical of the belief that teachers resist change in their professional practices merely as a result of their personal beliefs. Cuban *et al.* (2001) point out that the school, as an institution may in itself be resistant to the changes needed for the successful integration of ICT. They argue that the cellular organisation of the school (with its strict time schedules and departmental boundaries) considerably reduces the cross-fertilisation of ideas within and between departments.

The seventh barrier to ICT use is one which is related to the no perception of benefits issue. Snoeyink and Ertmer (2001) noted the importance of teachers seeing a purpose in using computers in their teaching, and hence there is a need for focused training to show teachers how technology can help them in their own individual situations. Cox *et al.* (1999) argue that if teachers find there is no need to question or change their existing professional practice, then they are unlikely to make use of ICT.

They believe that the perceived usefulness of computers to teaching is an important factor for teachers and as such it should be included in any ICT training programme (to ensure teachers are convinced of the value of using ICT in their teaching). Yuen and Ma (2002) discuss the importance of perceived usefulness, stating that this factor influences computer acceptance to a much greater extent than *perceived ease of use*. According to them a computer system is useful only if it is applied to a context; arguing further that

without understanding how computers can be integrated into teaching, teachers may not perceive computers as useful at all.

2.12 Conclusions

This chapter has presented the literature review and documentary analysis relating to the area of investigation. It offers a justification for the research reported on and analysed in the thesis. Each and every section of the topic discussed has a direct bearing upon the area of focus, which is an investigation into the application of e-learning materials to teaching and learning in post-compulsory education in the West Midlands.

Chapter 2 has discussed the role of technology in education; the positive impacts of technology on pedagogy; the role of technology in the development of thinking in post-16 education sector; and the learning styles theory and its implications for pedagogy. This chapter has also included a brief account of issues relating to designing and delivery of e-learning materials; the difference between student-centred flexible learning and teacher-centred traditional learning environment; and blended learning approach. It has discussed the relationship between ICT and pedagogy; the effects of ICT on attainment; and has offered a detailed review on the teachers' barriers to ICT use.

Chapter 3

Research Methodology

3.1 Introduction

The aim of this chapter is to present the research methodology employed in this investigation. *Methodology* refers to the whole process of gathering data. It provides us with the range of approaches used in educational research to gather data, which are to be used as a basis for inference, interpretation, explanation and prediction. Cohen *et al.* (2000: p45) cited Kaplan (1973) who suggested that:

> the aim of methodology is to help us to understand, in the broadest possible terms, not the products of scientific inquiry but the process itself.

The main areas which will be discussed in this chapter are: the context of educational research; justification for methodological triangulation; the research design (survey and case studies); the sampling design (non-probability/purposive sampling); and strategies for data collection (semi-structured interviews, structured questionnaires and semi-structured non-participant observations). This chapter will also highlight how data has been processed and analysed for each instrument employed, as well as discussing the limitations of the research methodology. Each strategy adopted in this research will be justified and reasons given for the choices made. Ethical considerations, aspects of validity and reliability will also be included in this chapter.

This chapter is structured as follows: Section 3.2 provides justification for methodological triangulation; Section 3.3 discusses the research design in which two separate sections are included: survey (Section 3.3.1) and case studies (Section 3.3.2); Section 3.4 describes the sampling design; and Section 3.5 discusses in detail the strategies for data collection. This section is divided into three subtopics to include semi-structured interviews, structured questionnaires and semi-structured non-participant observations. Section 3.6 outlines the methods adopted in processing and analysing the data collected; Section 3.7 addresses ethical issues; Section 3.8 covers the issues of validity and reliability; while Section 3.9 discusses the limitations of the research methodology. Section 3.10 concludes the overall presentation of Chapter 3.

3.2 Justification for Methodological Triangulation

As has been pointed out in Section 1.1, the aim of this research is to investigate the application of e-learning materials to teaching and learning in post-compulsory education in the West Midlands. Methodological triangulation is used as the research strategy in which two or more methods of data collection are used in the study of certain aspects of human behaviour. In its use of multiple methods, triangulation may utilise either normative or interpretive techniques; or it may draw on methods from both approaches and use them in combination. Since the nature of inquiry of this research is associated with certain aspects of human behaviour, interpretive approaches are considered to be the most suitable approach. In line with this approach, Hammersley and Atkinson (1983) view that the social world should be studied in its natural state, without the intervention of, or manipulation by the researcher; in contrast with the

normative researchers (positivists) who try to devise general theories of human behaviour and to validate them through the use of increasingly complex research methodologies. By adopting an interpretive approach, the researcher will examine situations through the eyes of participants (respondents) rather than from his own perspective, and that is why surveys in the form of semi-structured interviews and case studies in the form of structured questionnaires and observational studies had been carried out in this investigation.

In educational research, *methods* refer to techniques and procedures used in the process of data gathering. *Triangulation* on the other hand, may be defined as the use of two or more methods of data collection in the study of some aspects of human behaviour. Triangular techniques in the social sciences attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint and in so doing, by making use of both quantitative and qualitative data. Campbell and Fiske (1959) view triangulation as a powerful way of demonstrating concurrent validity, particularly in qualitative research. The more the outcomes of the questionnaires and interviews with the survey correspond to those of the observational studies, the more confident the researcher will be about the findings. Methodological triangulation (using different methods on the same object of study) is used for this research, a combination of survey (quantitative data) and case study (qualitative data) as the research strategy.

A range of methods has been used to achieve triangulation in this research. Firstly a survey was conducted to identify the range of settings in which e-learning materials are used in FE colleges; to examine their mode of delivery of e-learning materials used; to

investigate the ways in which e-learning materials are used and applied; to study the implications for the pedagogy of e-learning materials; and to examine the main issues related to the application of e-learning materials used in FE colleges. Surveys can be considered to be the best approach for quantitative data collection as they enable the researcher to gain access to empirical data and to have a wide and inclusive coverage.

Secondly a case study was conducted to examine the actual application of e-learning materials in the selected FE colleges through semi-structured non-participant classroom observations. Apart from that, the case study approach was used to identify the learners' and teachers' attitudes and perceptions on the application of e-learning materials to teaching and learning by distributing questionnaires to the participants of the observational studies. Case study can be considered to be the most suitable approach to carry out this small-scale qualitative investigation as it is benefitted by the use of variety research methods. Throughout the research a reflective diary was kept, in which the researcher's thoughts about the research process were recorded. The researcher's reflections on the research process and the effectiveness of particular approaches were also recorded. Information from the said reflections were then used to discuss aspects of the research findings in later chapters.

3.3 The Research Design

Research design is governed by the notion of *fitness for purpose*. The purposes of the research determine the methodology and design of the research.

(Cohen *et al.* 2000: p73).

3.3.1 Survey

A survey has several characteristics and several claimed benefits. Typically it is used to scan a wide field of issues in order to measure or describe any generalised features. It gathers data on a one-shot basis and hence is economical and efficient; represents a wide target population and generates numerical data. Surveys provide descriptive, inferential and explanatory information, gather standardised information by using the same instruments and questions for all participants and have the ability to capture data from multiple choice, closed questions, test scores or observation schedules. At the same time they make generalisations about and observe patterns of response from the target audience and gather data, which can be processed statistically. However, they usually rely on large-scale data gathering from a wide population in order to enable generalisations to be made about given factors or variables. It is important to pilot a survey. The pilot is used to test the actual survey instrument itself. For this research, a small-scale survey involving nine FE colleges was carried out and semi-structured interviews were chosen as the strategy to gather data.

3.3.2 Case Studies

A case study:

> is a specific instance that is frequently designed to illustrate a more general principle.
>
> (Nisbet and Watt, 1984: p72)

It provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles. Case studies can penetrate situations in ways that are not always susceptible to numerical analysis.

Case studies have a number of advantages that make them attractive to educational researchers. It enable the researcher to catch unique features that may otherwise be lost in larger scale data; and these unique features might hold the key to understanding the situation. They are strong on reality and provide insights into other similar situations and cases, thereby assisting their interpretation. Apart from that, case studies can be undertaken by a single researcher without needing a full research team and they can embrace and build in unanticipated events and uncontrolled variables (Nisbet and Watt, 1984).

For this investigation, case studies were carried out in three FE colleges and the strategy for data collection and analysis was questionnaires and semi-structured non-participant classroom observations.

3.4 The Sampling Design

Questions of sampling arise directly out of the issue of defining the population on which the research will focus.

> The quality of a piece of research not only stands or falls by the appropriateness of methodology and instrumentation but also by the suitability of the sampling strategy that has been adopted.
>
> (Cohen *et al.* 2000: p92).

Whether it is a qualitative or quantitative data, the essential requirement is that the sample is representative of the population from which it is drawn. The researcher needs to consider four key factors in sampling: the sample size; the representativeness and parameters of the sample; access to the sample; and the sampling strategy to be used.

The selection of a sampling strategy in turn must be governed by the criteria of suitability. In deciding which strategy to adopt, the researcher needs to consider the following: the purposes of the research; the time scales and constraints on the research; the methods of data collection; and the methodology of the research.

For this investigation, a survey was carried out in nine FE colleges which would be the representative samples of the 53 colleges in the West Midlands as the samples represent almost 17% of the total population. The colleges were identified and selected based on the OFSTED (OFSTED, 2004) reports as having effective use of ICT through their external inspections. The decision to select these colleges was also due to the accessibility factor, to gain easy access to the sample as the researcher lived in Birmingham when the fieldwork was carried out. In this way it will be more economical in term of money and the time spent for the whole duration of the research period.

Out of the nine FE colleges surveyed, a sample of three colleges was selected for the case study investigation. The criteria for the selection of these colleges were mainly based on the active use of e-learning materials in their curriculum areas based on the results of the semi-structured interviews conducted earlier.

In educational research there are two main methods of sampling: a probability (random sample) or a non-probability (purposive sample). A non-probability sample was used as the sampling strategy for this research. For a small-scale research, a non-probability sample is often used because it is less complicated to set up and less expensive. In purposive sampling, researchers select the cases to be included in the sample on the basis of their judgment of their typicality. In this way, the researcher selected samples

that are satisfactory to his needs since the sample was chosen for a specific purpose. That was why a non-probability, purposive sampling method was chosen for this research. As the focus of this research is to investigate the application of e-learning materials in FE colleges, it was justified that the selection of samples was taken from the list of the colleges having good ICT use from the OFSTED report, instead of randomly selected samples from the 53 FE colleges in the West Midlands. In this way the researcher can avoid the possibilities of getting samples which have very little use of ICT and e-learning materials in their curriculum areas.

3.5 Strategies for Data Collection

The researcher needed to determine the most appropriate data collection instruments to get data to answer the research questions. The instruments needed to be piloted, and subsequently refined. In order to obtain the most appropriate instruments, the researcher needed to consider the strengths and weaknesses of different data collection instruments. Three different types of data collection methods were employed in this research. The researcher opted for semi-structured interviews to carry out the survey on the e-learning materials and decided on structured questionnaires and semi-structured non-participant observations for the case studies on the application of e-learning materials in FE colleges.

3.5.1 Semi-structured Interviews

The research interview has been defined:

> as a two-person conversation initiated by the interviewer for the specific purpose of obtaining research-relevant information, and focused by him on content

> specified by research objectives of systematic description, prediction, or explanation.
>
> (Cannell and Kahn, 1968: p527).

It involves the gathering of data through direct verbal interaction between individuals.

Interviews are used to gather data in educational research and considered very useful instruments for qualitative data analysis as it allows for greater depth compared to other methods of data collection. They have a higher response rate because respondents become more involved and hence motivated. Interviews are known to be better than questionnaires in terms of handling more difficult and open-ended questions. Interviews enable participants (interviewers and the interviewees) to discuss their interpretations and to express how they regard situations from their point of view. The semi-structured approach is the popularly used interview technique. In a semi-structured interview, a schedule is prepared but it is sufficiently open-ended to enable the contents to be subjected to further probing and discussions.

For the purpose of this research, semi-structured interviews were used as the principle means of gathering information having a direct bearing on the research objectives. Thirteen key staff were interviewed from nine different FE colleges, comprising of the Vice Principal (Curriculum and Quality), ILT Development Manager, ICT Services Manager, ILT Coordinators, ILT Manager, E-learning Coordinator, E-learning Manager, ILT Champions and Head of Departments. Please refer to Table 3.1 for the complete breakdown of respondents of the semi-structured interviews.

Table 3.1: Breakdown of respondents of the semi-structured interview

Colleges	Job title	Number of respondents
College A	(i) Vice Principal (Curriculum and Quality)	2
	(ii) E-learning Coordinator	
College B	(i) ILT Coordinator/Head of English	2
	(iii) ILT Champion/Head of Sociology	
College C	E-learning Manager	1
College D	ILT Development Manager	1
College E	(i) Head of Physical Education	3
	(ii) Head of Modern Foreign Language	
	(iii) ILT Coordinator/Head of English	
College F	ILT Coordinator	1
College G	ILT Champion	1
College H	ILT Manager	1
College I	ICT Services Manager	1

Prior to this, a pilot survey was carried out in a single college, to enable the researcher to refine the contents, wording, and length of the interview questions as appropriate for the sample being targeted. Please refer to Appendix 1 for the sample of the question format of the semi-structured, face-to-face interviews conducted in this research.

In the early stage the researcher had problems getting samples for the semi-structured interviews. Initially a formal request was made to the Curriculum Heads of 15 FE colleges, seeking their permission to carry out the investigation. These colleges were selected from a cross section of the West Midlands' colleges, comprising of urban, rural, large and small. Unfortunately there were no responses to any of these letters. The next step undertaken was to personally visit a few colleges around Birmingham with the intention of looking for colleges that would agree to allow the researcher to carry out

this investigation, however there was no response from any one of them. The researcher then decided to look for colleges listed under the OFSTED report as having effective use of ICT and sent out another 15 letters (the letters were issued through the Faculty of Education, using the University's letterhead, signed by the Research Director and the researcher himself, and addressed to the colleges' Principal). The researcher managed to get nine FE colleges which agreed to participate and subsequently nominated their staff (key persons with ICT role) to participate in this research.

The interviews were conducted with the help of an interview guide (written schedule) which was prepared earlier. The interview schedule contained the relevant questions (open ended) to be used during the interview sessions. Before the interview started, a copy of the schedule was given to the respondents, so that the interview could be conducted smoothly and efficiently. This is important, as the researcher was only granted 30 minutes to conduct and complete the semi-structured interviews with each respondent.

3.5.2 Structured Questionnaires

Questionnaires are widely used and useful instruments for collecting survey information, providing structured, often numerical data as they can be administered without the presence of the researcher and they are often comparatively straightforward to analyse (Wilson and McLean, 1994). Structured, closed question questionnaires are useful because they can generate frequencies of responses agreeable to statistical treatment and analysis as well as enabling comparisons to be made across groups in the sample. Closed questions (rating scales) questionnaires prescribe the range of responses

from which the respondent may choose, are quick to complete and straightforward to code. Rating scales questions are considered to be useful devices for researchers, as they incorporate a degree of sensitivity and differentiation of response.

> Rating scales are widely used in research, and rightly so, for they combine the opportunity for a flexible response with the ability to determine frequencies, correlations and other forms of quantitative analysis. They afford the researcher the freedom to fuse measurement with opinion, quantity and quality.
>
> (Cohen *et al.* 2000: p253).

Two sets of questionnaires were used in this research (structured, closed questions and were formatted using rating scales). The Learners' Questionnaires were used to investigate the learners' attitudes and perceptions on the application of ICT and e-learning materials. The Teachers' Questionnaires, on the other hand, were used to investigate the teachers' attitudes and perceptions to the application of ICT and e-learning materials in FE colleges. Unlike the semi-structured interviews which were treated as the principle means of gathering data for this research, the learners' and teachers' questionnaires were used as additional methods of data collection, to provide corroboration and triangulation. Fifteen teaching staff from three different FE colleges completed the Teachers' Questionnaires during the case study investigation. From the same three colleges, a total of 153 students completed the Learners' Questionnaires (49 male and 104 female respondents of which 137 were full time students and 16 part time students). Please refer to Appendix 2 for the sample of the question format of the Teachers' Questionnaires and Appendix 3 for the sample of the question format of the Learners' Questionnaires.

3.5.3 Semi-Structured Non-participant Observations

Observational methods are considered to be powerful tools for gaining insight into situations. It was argued that:

> observations enable the researcher to gather data on the physical setting, the human setting, the interactional setting and the programme setting.
>
> (Morrison, 1993: p80).

Apart from that it was found that:

> observational data are attractive as they afford the researcher the opportunity to gather *live* data from *live* situations.
>
> (Cohen *et al.*, 2000: p305).

The semi-structured non-participant classroom observations were also used as additional methods of gathering data for this research. The main objective for carrying out the observational studies was to witness the actual application of e-learning materials to teaching and learning in FE colleges. Twelve teaching sessions from three different FE colleges were observed. Prior to the classroom observations, a pilot study was carried out at the Faculty of Education, Birmingham City University, principally to increase the reliability, validity and practicability of the actual observational studies.

As a non-participant observer, the researcher needed to stand apart from the group activities being investigated. The main focus of the activity was to observe the participants (teachers and learners) and to record their activities using field notes. Field notes are widely used since they are useful for recording observations, behaviour, events and activities of all the participants. When conducting the observational studies the researcher had also recorded the ICT facilities available in the classrooms (the

interactive whiteboard, satellite TV, data projector, VLEs, applications software, Internet, Intranet, videos and the amount of computers available in each classroom or computer lab).

3.6 Processing and Analysing of Data

Data analysis is a process which involves organising; accounting for; and explaining the data collected. It is a process of making sense of the data in terms of the participants' definitions of the situation, noting patterns, themes, categories and regularities. Before the data can be analysed, first they have to be processed and each instrument has to undergo a different type of data processing. As such the researcher needed to decide which methods of data processing and data analysis were most appropriate for which types of data (quantitative and qualitative) and for which research questions. At the same time it is important for the researcher to ensure that the data processing and analysing would serve the research purposes.

It is important for the researcher to consider the type of data analysis to be used for the interviews, questionnaires and observational studies. For instance the layout and structure of the questionnaires need to be planned very carefully in order to assist data entry for computer reading and analysis. An inappropriate layout may hinder data entry and subsequent analysis by computer. It is important to ensure that the type of data analysis is appropriate for the type of data gathered. Once the data from the various instruments have been collected the next stage is to process and analyse them. At this stage the researcher needed to ensure that the data were comprehensive enough to enable other researchers to reproduce the analysis that was made.

For the semi-structured interviews, the data collected were then transcribed. Transcription is a process which involves preparing the interview materials for analysis, a transcription from oral speech to written text. Care had to be taken during the transcription process, to avoid any (massive) data loss, data misrepresentation and reduction of complexity. Initially the transcriptions from oral speech (audio recorder) to written text were done manually. The transcriptions were then typed (using a computer), edited and proof read and they were finally transformed into an interview transcripts. The transcripts were then subjected to content analysis.

Microsoft Excel was used to process the questionnaires. This software can be considered as a very useful tool in the design, administration and processing of questionnaires, for off or on-screen administration. Some of the advantages of using this software are: it enables responses to be entered rapidly; data can be examined automatically; it can produce graphs, tables and pie charts which were later analysed.

As for the semi-structured non-participant observations the data from field notes were transferred into observation reports where transcriptions and more detailed observations were written out fully. In the observation reports a comprehensive and detail accounts of what happened; descriptions of the physical settings of events; descriptions of events; behaviour and activities recorded earlier were also included. Findings from the observation reports were then analysed to track how selected learners were engaging with ICT based learning resources.

3.7 Ethical Issues

In order to establish an ethical position with respect to this research, the researcher made a formal request to the FE colleges identified to seek their cooperation. This principle of informed consent was crucial mainly because the researcher was not only asking for their permission to carry out the research but at the same time seeking their cooperation and assistance in the organisation and implementation of the research. Apart from seeking their permission to carry out the interviews, observations and giving out questionnaires to the respondents, the covering letters indicated the purposes of the research and provided assurances of confidentiality, anonymity, and non-traceability (Appendix 4 and Appendix 5). At the end of each interview, classroom observations and giving out questionnaires, *thank you* letters were sent out to all participating FE colleges, to record the researcher's appreciation for the cooperation extended by them (Appendix 6).

BERA (2004) has published a Revised Ethical Guidelines for Educational Research in which they offer guidelines on responsibilities to participants, sponsors of research, and to the community of educational researchers. Some of the important issues highlighted in the Ethical Guidelines are voluntary informed consent, right to withdraw, privacy, and integrity and reputation of educational research.

Voluntary Informed Consent

This is a situation where participants understand and agree to their participation without any duress, prior to the research getting under way. In meeting this requirement the researcher has taken the necessary steps (verbally) to ensure that all participants in the

research understood the process in which they would be engaged, why their participation was necessary, how the research will be used and how and to whom the findings of the research will be reported.

Right to Withdraw

The right of any participant to withdraw from this research for any or no reason, and at any time was recognised and accordingly they were informed of this rights verbally as well as in written form. The researcher would like to record his appreciation to all the participants for their invaluable support and understanding towards this research.

Privacy

The confidentiality and anonymous treatment of participants' data was considered the norm for the conduct of this research. The participants' entitlement to privacy was recognised, as such the researcher duly accorded their rights to confidentiality and anonymity. For example the name, age, gender, ethnicity of the respondents were not disclosed in the thesis. Even the names of the FE colleges and their exact locations were not mentioned. Throughout the thesis, the nine FE colleges participated in the survey and case study were known as College A, College B, College C, College D, College E, College F, College G, College H and College I. The 13 respondents who participated in the semi-structured interviews were known by their job title: Vice Principal (Curriculum and Quality), E-learning Coordinator, ILT Coordinator, ILT Champion, E-learning Manager, ILT Development Manager, ILT Manager, ICT Services Manager, Head of English, Head of Sociology, Head of Physical Education and Head of Modern Foreign Language.

Integrity and Reputation of Educational Research

The researcher has protected the integrity and reputation of educational research by ensuring the research was conducted to the highest standards possible and in accordance to the BERA (2004) Revised Ethical Guidelines for Educational Research.

3.8 Issues of Validity and Reliability

Validity is an important key to effective research and thus a requirement for both quantitative and qualitative research. In qualitative data, validity might be addressed through the scope of the data achieved, the participants approached and the extent of triangulation. In quantitative data, validity might be improved through careful sampling, appropriate methods of data collection, and appropriate statistical treatment of the data. It is almost impossible for research to be 100% valid, at best the researcher should strive to minimise invalidity and maximise validity.

To maximise validity the following steps were taken throughout the research process: choosing an appropriate time scale; selecting an appropriate methodology for answering the research questions; selecting an appropriate instruments for gathering the type of data required; and using an appropriate sample, one which was representative, not too small or too large. The most practical way of achieving greater validity in interviews for example would have been to minimise the amount of bias as much as possible. The sources of bias may include the characteristics of the interviewer; the characteristics of the respondents; and the substantive content of the interviewer's questions.

In quantitative research, reliability on the other hand is essentially a synonym for consistency and replicability over time, instruments and groups of respondents. It is concerned with precision and accuracy. For research to be reliable it should be in a position to demonstrate that if it were to be carried out on similar group of respondents and in similar context, then similar results would be found. In qualitative research, reliability can be achieved when what the researcher records as data is similar to what actually occurs in the natural setting that is being research.

One way of controlling the reliability in an interview is to have highly structured interviews (with the same format, sequence of words and questions for each respondent). On the other hand it is argued that the most important issue to be considered in achieving reliability and validity in surveys and case studies is that of sampling (Cohen *et al.* 2000). To ensure validity, the questionnaires used need to be piloted, so that the contents, wording and length can be refined as appropriate for the sample being targeted. Similarly, to ensure validity in observational studies, a pilot study must be conducted to ensure that the observational categories themselves are appropriate, complete, distinct, clear and effectively operationalise the purposes of the research.

3.9 Limitations of the Research Methodology

In this section the thesis will discuss the limitations of the research methodology for each instrument used (interviews, questionnaires and observational study).

Interviews

The first limitation could be that the sample itself may not necessarily be representative of the total population under study. The survey was carried out on nine FE colleges based on the OFSTED report as having effective use of ICT in teaching and learning instead of randomly selected the 53 FE colleges in the West Midlands.

Secondly it was difficult for the researcher to respond spontaneously in the interviews, as they were semi-structured. However it was better to be able to respond and adapt the semi-structured interview's questions than to use structured interviews where the researcher would not be able to do this.

The third limitation could be due to the fact that participants were selected by the Principals or the Vice Principals, and this could be a source of bias. However the selection of the respondents (nominated by Principals and Vice Principals) was considered reasonable and realistic, as they were the key persons who were crucial to the overall implementation and administration of delivering e-learning materials in FE colleges.

Lastly the respondents might not give their actual views to the questions asked. This could be due to situations where they could not predict the questions to be asked as the interview schedule was given to them about ten minutes before the interview was about to start.

Questionnaires

The first limitation could be that the respondents might not give their actual views and opinions to the questions asked, especially those questions which were related to their attitudes and perceptions on the applications of ICT and e-learning materials used in teaching and learning. It was not clear whether they (the learners) were giving an honest response as their teacher was present at the time when they were responding to the questionnaires.

The second limitation is that the sample itself may not necessarily be representative of the total population under study. However this issue is not very critical since the teachers' and learners' questionnaires were used as additional methods of data collection and were not the principal method of data collection.

The third limitation could be due to the fact that the sample for the case study (learners' questionnaires) was not randomly selected as the questionnaires were given to the learners that participated in the classroom observations.

Observations

The first limitation is that the sample was not randomly selected; as such they may not necessarily be representative of all the FE colleges in the West Midlands. This could be a source of bias since all the colleges participating in this investigation were judged to be effective in their use of ICT. A sample of three colleges was selected out of the nine FE colleges participated in the interview survey and the criteria for the selection of these colleges were mainly based on the active use of e-learning materials in their curriculum areas.

The second limitation is that the teachers and learners who participated in this observational study knew that they were being observed. This may lead to a situation whereby the teachers may have prepared specially for that teaching sessions and the students may change behaviour as the researcher was there observing them especially if they are aware of ICT emphasis.

3.10 Conclusions

This chapter has presented in detail the research methodology used in this investigation. The relevant strategies adopted for this research were discussed: methodological triangulation; the research design; the sampling design; strategies for data collections; and how data were processed and analysed. This chapter has also deliberated on ethical issues; issues of validity and reliability; and limitations of the research methodology.

This chapter has not only elaborated on the strategies used but provided definitions and theories, which linked to the specific techniques and strategies. More importantly, it offered justifications for each choice made and highlighted the strengths as well as the limitations of the different strategies adopted in the research methodology.

Chapter 4

Findings: The Range of Settings in which E-learning Materials are used in Post-compulsory Education and the Mode of Delivery of E-learning Materials used

4.1 Introduction

The aim of this chapter is to present the findings on the range of settings in which e-learning materials are used and the mode of delivery of e-learning materials used in post-compulsory education. Results from the survey on the application of e-learning materials used in FE Colleges which will be reported in this chapter, Chapter 5 and Chapter 6 are based on evidence received through the semi-structured interviews. As pointed out in Chapter 3 (Research Methodology) 13 key staff from nine FE colleges have been interviewed comprising the Vice Principal for Curriculum and Quality, ILT Manager, ILT Development Manager, ICT Services Manager, E-learning Manager, E-Learning Coordinator, ILT Coordinators, ILT Champions, and Head of Departments. The survey's respondents had direct experiences of using ICT and e-learning materials to teach students either personally, or where they were directly involved with the management of ICT through their involvement in the planning and implementation of e-learning strategies. Most importantly, they had a central role in managing and developing the use of ICT in the classroom, so they were in a very strong position to comment on the issue in their college. In this way they had first hand and very recent

evidence of the factors and information related to the areas being researched.

This chapter is structured as follows: Section 4.2 presents the findings on the range of settings in which e-learning materials are used in post-compulsory education. This section examines the curriculum areas and subjects which e-learning materials are used. Section 4.3 highlights findings on the mode of delivery of e-learning materials used. This section is divided into three subtopics; the modes of delivery of e-learning materials used; the prevalence of VLE use and the strengths and weaknesses of the modes of delivery. Findings on the primary sources of e-learning materials used will be presented in Section 4.4, while discussion on the commercially produced versus self-developed e-learning materials is included in Section 4.5. The overall presentation of Chapter 4 will be summarised in Section 4.6.

4.2 The Range of Settings in which E-learning Materials are Used in Post-compulsory Education

For the purpose of this thesis, *range of settings* refers to the curriculum areas which used e-learning materials in teaching and learning. The results from the interviews were analysed under three main headings: the curriculum areas which used e-learning materials; the main curriculum areas which used e-learning materials; and the extent to which e-learning materials are used in these curriculum areas. Comments will also be made on the qualifications using e-learning materials (for example GNVQs, GCSEs or A-Levels).

4.2.1 The Curriculum Areas which Used E-learning Materials

Based on the interview results, it was revealed that a majority of the FE colleges had a wide variety of curriculum areas which used e-learning materials. Ten groups were identified. Each one comprised 2 to 4 curriculum areas (please refer to Table 4.1). It is important to clarify here that Table 4.1 shows curriculum areas that used e-learning materials, irrespective of the amount of e-learning materials used. The ten groups of curriculum areas are presented as follows:

Group 1
Science
Medical Sciences
Biological Sciences

Group 2
Sociology
Humanities
General Studies

Group 3
English
English Literature
Modern Foreign Languages

Group 4
Art and Design
Creative Arts
Film and Communication Studies

Group 5
Business Studies
Business Administration
Information Technology
Computing

Group 6
Travel and Tourism
Sport Studies
Health Studies

Group 7
Hospitality and Catering
Health and Safety

Group 8
Hair and Beauty
Childcare and Caring
Beauty Therapy
Personal Development

Group 9
Teaching and Training
Teaching Aids
Specialised Learning

Group 10
Building Environments
Motor Vehicles
Constructions
Engineering

Table 4.1: The curriculum areas in which e-learning materials are used in the selected FE colleges in the West Midlands

Colleges	Science Medical Sciences Biological Sciences *(Group 1)*	Sociology Humanities General Studies *(Group 2)*	English English Literature Modern Foreign Languages *(Group 3)*	Art and Design Creative Arts Film and Communication Studies *(Group 4)*	Business Studies Business Admin. Info Tech (IT) Computing *(Group 5)*
College A			√	√	√
College B	√	√	√	√	√
College C	√			√	
College D					√
College E		√	√	√	√
College F			√	√	√
College G					√
College H	√	√			
College I	√	√		√	√

Table 4.1: The curriculum areas in which e-learning materials are used in the selected FE colleges in the West Midlands (*Continuation*)

Colleges	Travel and Tourism Sport Studies Health Studies ***(Group 6)***	Hospitality and Catering Health and Safety ***(Group 7)***	Hair and Beauty Childcare and Caring Beauty Therapy Personal Development ***(Group 8)***	Teaching and Training Teaching Aids Specialised Learning ***(Group 9)***	Building Environ-ments Motor Vehicles Constructions Engineering ***(Group 10)***
College A	√	√	√	√	
College B					
College C					
College D			√		√
College E					
College F			√		√
College G			√	√	√
College H					√
College I	√	√			√

Note: The above data were extracted from the results of the semi-structured interview survey.

It was noted that the majority of the FE colleges used e-learning materials in Group 5 (Business Studies, Business Administration, Information Technology and Computing) as 78% of the sample confirmed using e-learning materials in these curriculum areas. The second most popular area was Group 4 (Art and Design, Creative Arts; and Film and Communication Studies) since 67% of the sample used e-learning materials in

these curriculum areas. Curriculum areas under Group 10 (Building Environments, Motor Vehicles, Constructions and Engineering) were considered as the third most popular area as 55% of the sample used e-learning materials in teaching and learning. E-learning materials were also quite popular in the following groups: Group 1 (Science, Medical Sciences and Biological Sciences); Group 2 (Sociology, Humanities and General Studies); Group 3 (English, English Literature and Modern Foreign Languages) and Group 8 (Hair and Beauty, Childcare and Caring, Beauty Therapy and Personal Development). About 44% of the FE colleges confirmed using e-learning materials in these curriculum areas. The less popular curriculum areas which used e-learning materials were Group 6 (Travel and Tourism, Sport Studies and Health Studies); Group 7 (Hospitality and Catering; Health and Safety); and Group 9 (Teaching and Training, Teaching Aids and Specialised Learning). Apart from the above curriculum areas, e-learning materials were also actively used in certain qualifications such as A-Levels, GCSEs and GNVQs. Six out of the nine FE colleges surveyed indicated that they used e-learning materials in these qualifications.

The decisions to use e-learning materials in these curriculum areas particularly in Group 5, Group 4 and Group 10 (Table 4.1) by the tutors, most probably to gain the positive impacts of technology on pedagogy (Means and Olsen,1993). On the other hand the reason for the little use of e-learning materials in certain curriculum areas (Group 6, Group 7, and Group 9) could be possibly linked to the fact that tutors in those colleges have not recognised the advantages of using e-learning materials in their teaching.

4.2.2 The Main Curriculum Areas which Used E-learning Materials

The main curriculum areas which used e-learning materials are highly variable *within* and *between* the selected FE colleges. This investigation has revealed that the prevalence of e-learning materials used *within* and *between* FE colleges depends largely on the courses and the individual tutors which will be discussed in Section 4.2.3.

An investigation into the main curriculum areas which used e-learning materials, has shown a highly variable responses among the interviewees as indicated by Table 4.2. Each college indicated an almost entirely different curriculum area for which e-learning materials were mainly used. Some of the curriculum areas being highlighted were: Information Technology (IT), Medical Sciences, Biological Sciences, Engineering, Languages, Business Studies, Art and Design, Construction, Building Environments, Computing, Physical Education, Sport Studies, Health Studies, Travel and Tourism, Hospitality and Catering, Childcare and Caring, Hair and Beauty. Qualifications using e-learning materials included A-Levels, Advanced GNVQ, and Higher-level GCSE courses.

Table 4.2: The main curriculum areas which used e-learning materials

College A	Art and Design, Business, Childcare and Caring, Hair and Beauty, Health and Safety, Hospitality and Catering, IT, Languages, Leisure and Tourism, Mathematics, Personal Development, Specialised Learning and Teaching Aids.
College B	A-Level Courses (AS, A2), IT courses, GCSE Courses, Vocational Courses, and Advance GNVQ Courses.
College C	Medical Science areas, and Biological Science areas.
College D	Engineering, Hair and Beauty, Childcare, High Level GCSE, IT, Business and Management.
College E	English, Modern Foreign Languages, Physical Education, and Business Studies.
College F	Construction areas, Electrical Engineering, Art and Design, Hair and Beauty, and ESOL (English for speakers of other languages).
College G	Teaching and Training, Business Administration, IT, Beauty Therapy, and Motor Vehicles.
College H	Building Environments (which includes practical courses in Plumbing, Electric and Electrical Installations), Painting and Decorating, Carpentry, and Brick-Laying.
College I	Health Studies, Hospitality and Catering, Sport Studies, Travel and Tourism, Science, IT, and Computing.

4.2.3 The Extent to which E-learning Materials are used on these Curriculum Areas

It was noted from the interviews that the extent to which e-learning materials were used on the main curriculum areas which used e-learning materials depended largely on four main factors: the courses and the subjects offered in each course; the individual tutors responsible for the specific courses and subjects; the availability of e-learning materials

in the college's departments; and the level of confidence of the individual tutors as reflected by the following interview extracts:

> It depends on the course. In some courses we used very little e-learning materials, in another course much more. In the best case, e-learning materials support probably half of the course's modules.
>
> (E-learning Coordinator from College A)

The above interview extract clearly indicated that the extent to which e-learning materials were used depended mostly on the course itself, some courses used very little e-learning materials, but other courses may use quite a substantial amount of e-learning materials.

As mentioned in the first paragraph, the extent to which e-learning materials are used in FE colleges also depends on the individual tutors and the availability of the e-learning materials in the college's departments, as highlighted by the ICT Services Manager from College I:

> It varies, we don't have a set and way in which teachers should use it; so teachers use it as and when they think it's appropriate. For certain modules which have a lot of materials it's very appropriate to use them; and for certain modules they don't. So it varies.

From the above interview extract we can interpret that there are FE colleges which do not have specific guidelines and directions for tutors to use e-learning materials in the courses that they teach. Although most FE colleges encouraged their tutors to use e-learning materials, it was up to individual tutors whether or not to use them in the classroom. Apparently, the tutor's decision to use e-learning materials is highly depended on the availability of e-learning materials in the college's departments. If

there are a lot of e-learning materials available, it is only appropriate for the tutors to use them. In contrast, if the e-learning materials available for use are very limited, then tutors may not use them.

The level of confidence of individual tutors is another factor, which determines the extent to which e-learning materials are used, as highlighted by the Head of Physical Education from College E:

> Within the department, we have different levels of confidence in terms of computing. But we are moving towards producing a whole specification on e-learning materials, predominantly using PowerPoint (application software).

The above interview extract serves as evidence to show that the level of confidence among tutors in FE colleges varies, and consequently departments which have many tutors with high level of confidence to use e-learning materials will definitely use more e-learning materials in their teaching compared to those departments with very few tutors having the same quality (high level of confidence to use e-learning materials).

The most significant issues here are:

- The extent to which e-learning materials were used on the main curriculum areas depended largely on: the courses and subjects offered in a particular course; individual tutors responsible for the courses/subjects; availability of the e-learning materials in the college's departments; and the level of confidence of the individual tutors to use e-learning materials. The second and the last point above are however interrelated and thus could be catagorised under one factor.

- Most FE colleges encouraged their tutors to use e-learning materials, but they do not have specific directions/guidelines which require tutors to do so. So it was up to the individual tutors whether or not to use e-learning materials in their teaching.

- Assuming that there are enough e-learning materials available for use, the level of confidence of individual tutors to use the e-learning in their teaching then becoming the determining factor on the extent to which e-learning materials are used.

We can relate the above findings with the Becta's Ten Pedagogic Principles for E-learning (Anderson and McCormick, 2005) with a special reference to Principle 1 (Match to the curriculum) and Principle 4 (Innovative approaches). What has been practiced by the tutors in FE colleges seem relevant with both principles based on the following extracts which has been mentioned earlier:

> It depends on the course. In some courses we used very little e-learning materials, in another course much more.
>
> (E-learning Coordinator from College A)

> It varies, we don't have a set and way in which teachers should use it; so teachers use it as and when they think it's appropriate.
>
> (ICT Services Manager from College I)

We can imply that the tutors only used e-learning materials if the pedagogy matches with the appropriate curriculum and at the same time they need to ensure that the

pedagogy of e-learning should be fit for purpose. It was also noted that tutors seem to make the decisions (whether or not to use e-learning and which resources to choose) in which case, the decisions made might not be in the best interests of pedagogy as described by Anderson and McCormick (2005).

The thesis has discussed factors, which influenced the extent to which e-learning materials are used in FE colleges and now it will focus on the ways in which e-learning materials are used and the extent to which they were being used by tutors and students as learning tools. Issues related to the ways in which e-learning materials are used in FE colleges will be discussed later in detail in Section 5.2. Evidence from the interviews has suggested that e-learning materials were mainly used as support and supplementary to traditional teaching and learning methods in the classroom and not to replace them. The e-learning materials were sometimes integrated with traditional learning methods (blended learning approach) and sometimes they were purely supplementary as highlighted by the ILT Coordinator/Head of English from College B,

> Obviously as a college we have students of 16 – 19 years old. They are not distance learners, so any use of ICT is an addition to what they are doing in the classroom. In other words we are using it mainly as a support to their classroom's work.

The following interview extract serves as evidence to show how e-learning materials are used as support and supplementary to traditional teaching and learning methods:

> We use it occasionally, though we use it on regular basis for listening comprehension and for listening exercises (by means of language lab). Otherwise there is the Intranet site for every subject which I am developing at the moment. I have put a lot of information and exercises on the German Intranet site, so students can use them quite a lot. Occasionally, I use the Internet in lessons.
>
> (Head of Modern Foreign Languages from College E)

The above extract has clearly demonstrated a situation where three different kinds of mode of delivery of e-learning materials were being used by a Modern Foreign Languages tutor to teach German in classrooms or in the language labs. The tutor used application software for listening comprehension and listening exercises; he used the college Intranet to channel information and exercises to his students; and he also used the Internet to find relevant information as well as to access the free online materials which could be used as course materials.

Apart from supporting and supplementing traditional teaching in classrooms, e-learning materials were used quite extensively as learning reinforcement tools outside classrooms as indicated by the following interview extracts:

> All we do is to use ICT to support teaching and learning in the classroom, or as (learning) reinforcement outside the classroom. But I think it will be true to say that to a lesser extent, all courses do use it in some way".
>
> (ILT Coordinator/Head of English from College B)

> Outside lessons, the Internet is used extensively by the Language Assistants as well as by me or my staff in order to help students to prepare their speaking tests because they have to gather a lot of knowledge.
>
> (Head of Modern Foreign Languages from College E)

The first extract is self-explanatory whereas in the second extract we notice that the Internet plays a very important role in certain courses such as the Modern Foreign Languages, in which the Internet was used extensively by the tutor, the Language Assistants and other academic staff to help students prepare for their speaking tests.

Both extracts support the earlier statement that e-learning materials were used quite extensively as learning reinforcement tools outside the classroom.

This study has also revealed that e-learning materials were also being actively used for conducting online assessments, for demonstrating skills, for supporting practical skills, for simulations, and as assignment support. The E-learning Manager from College C has the following comment in relation to the use of e-learning materials to conduct online assessments:

> At the moment the e-learning materials are used extensively in the courses which used them. Certainly we have for example tutors using video and multimedia, in terms of course delivery. But they also use computer-aided assessments for formative assessments. I am currently looking at some of the use of (e-learning) materials in NVQ for summative works as well as formative works.

It seems clear that the above extract not only tells us that the e-learning materials were used extensively in College C but more importantly it serves as evidence to confirm that tutors used video and multimedia for course delivery as well as computer-aided assessments (online assessments) to conduct formative assessments. In fact the E-learning Manager was in the midst of looking for possibilities of extending the use of e-learning materials to conduct summative assessments as well.

The above findings can be linked to Principle 6 (Formative assessment) and Principle 7 (Summative assessment) of the Becta's Ten Pedagogic Principles for E-learning (Anderson and McCormick, 2005). Principle 6 stresses the importance of the pedagogy of e-learning materials to provide formative assessments (which has been implemented in College C). As for Principle 7, it was argued that the pedagogy of e-learning

materials should not only provide summative assessments but the assessments must also be:

- valid and reliable.
- comprehensible by teachers, learners and parents.
- able to deal with a range of achievement levels.
- free from adverse emotional impact on the learner.

The following interview extract with the ILT Coordinator from College F shows us other areas where e-learning materials were used extensively by the tutors in FE colleges:

> In the Construction area, they (the e-learning materials) are used for demonstrating skills and to support practical skills such as woodworking, which uses quite a lot of video for example. Within the Electrical Engineering area, they (tutors) use a great deal of e-learning materials for simulations, where you use modeling to construct a circuit, diagrams and etc. Simulations software are used quite extensively. Simulations software are also used in the telecom element in Engineering courses as well.

The above extract explains the main areas, which used e-learning materials and highlights examples in relation to the mode of delivery of e-learning materials used and the purposes of using them. We note that video was used quite heavily in Construction areas, for demonstrating skills and for supporting practical skills (eg. woodworking skills). Apart from video, simulation software was also used quite extensively in the Electrical Engineering area and in the telecom element of other Engineering courses to create simulations.

As been mentioned in the earlier paragraph, the e-learning materials were also used as assignment support. The following comment from the Head of English/ILT Coordinator from College E supports the above finding:

> We have four subjects within the English Department, and we have different areas of the Internet and Intranet devoted to each of those. And I've got worksheets, resources and information materials and task sheet, all on the college Intranet. There is a lot of hyperlinks for the students to visit different sites and the tasks for the students to do and I deliver them at the beginning of the lessons. One of the tasks they've got to do, is to visit various different websites, collect data, cut and paste information to their own Word document and collect that for their own notes, their own files and they have to use that data for analysing and put it on a table at the end of the session. They will spend about a week on this task and then they will e-mail me on the college network their summative works.

The above extract shows us how e-learning materials were used by tutor in the English Department to support and supplement traditional teaching. The e-learning materials were systematically integrated with the traditional teaching, aimed to help tutors with their course delivery and to help students with their assignments and research projects. It was noted that the tutor channeled her worksheets, resources and information materials into the college Intranet for the students to visit. The students, on the other hand used the Internet to collect relevant information (data) for their assignments and research projects and they need to cut and paste the data so collected into their Word documents for processing and analysing. The completed assignments were then emailed to their respective tutors through the Internet or the college Intranet.

The above findings serve as good examples on the use of e-learning materials in the teaching of English. Becta (2004) identified factors which affect the learners' attainment in the primary and secondary education, one of which is the teacher's

pedagogies. Based on their findings, teacher's pedagogies have a large impact on pupil's attainment and that insufficient understanding of the scope of an ICT resource leads to inappropriate or superficial uses in the curriculum. In relation to this issue and based on the comment made by the Head of English/ILT Coordinator from College E, we can imply that tutors in the English Department seemed to be knowledgeable on how to choose the appropriate e-learning materials in their teaching and to further ensure that the chosen materials are relevant to the teaching and learning purposes.

With regards to the use of Word Processing in a network-learning environment, it was observed that there was significant improvement and greater engagement in writing (Allen and Thomson, 1995). The use of Word Processing in English however, may lead to both negative and positive effects in terms of its contribution to improve student's achievement (Barker and Pearce, 1995).

This study has also indicated that in some instances, e-learning materials were widely used by all courses in certain FE Colleges as confirmed by the ILT Development Manager from College D:

> We have got about 19 courses now and about 3000 students that use the WebCT. Next year (2006), from September onwards all students will have access.

It is important to note that although the e-learning materials were widely used in some FE colleges however the level of use among the various courses varied. For example, the e-learning materials could be heavily used in certain courses, but in other courses the usage were somehow limited, as commented by the ILT Champion from College G:

The main vehicle (mode of delivery) that we used is the Intranet system and all departments have a section of that Intranet system to develop. In the Teachers Training course, the college Intranet is very heavily used. In the Business Administration course the Intranet is also heavily used. The other courses are not quite heavy at the moment.

The most significant issues in Section 4.2 are:

- The majority of the FE colleges had a wide variety of curriculum areas which used e-learning materials in teaching and learning.

- The main curriculum areas which used e-learning materials were highly variable within and between the selected FE colleges.

- The prevalence of e-learning materials used within and between FE colleges depended largely on the courses and the individual tutors.

- The extent to which e-learning materials were used on the main curriculum areas depended on:
  - The courses and the subjects offered in each course.
  - The individual tutors responsible for the specific courses and subjects.
  - The availability of e-learning materials in the college's departments.
  - The level of confidence of individual tutors in the college's departments.

- The e-learning materials were mainly used as support and supplementary to traditional teaching and learning methods, not to replace them.

4.3 Mode of Delivery of E-learning Materials Used in Post-compulsory Education

Section 4.2 has presented the findings on the range of settings in which e-learning materials are used in post-compulsory education. This section will discuss the findings on the mode of delivery of e-learning materials used by FE colleges. The main areas which will be investigated in this section will be the following: mode of delivery of e-learning materials used; prevalence of VLE use as mode of delivery of e-learning materials; and the strengths and weaknesses of the modes of delivery of e-learning materials used.

4.3.1 Mode of Delivery of E-learning Materials Used

For the purpose of this thesis *mode of delivery of e-learning materials* refers to a system or technological innovation, which enable the e-learning materials to be delivered to the end users. Based on the results from the interviews, there were all together six modes of delivery of e-learning materials, most commonly used: CDROMs, Virtual Learning Environments (VLEs), applications software, Intranet, Internet and videos. Applications software was the most popular mode of delivery since all the FE colleges studied confirmed using them in their teaching and learning. The second most popular mode of delivery was VLE (89%), followed by CDROM (78%). Other modes of delivery, which were also popular were Intranet, Internet and videos, (56% of the sample confirmed using them to deliver e-materials). Please refer to Table 4.3 and Figure 4.1, which present the results. Table 4.3 presents the mode of delivery of e-learning materials used and the type of VLEs and applications software used by

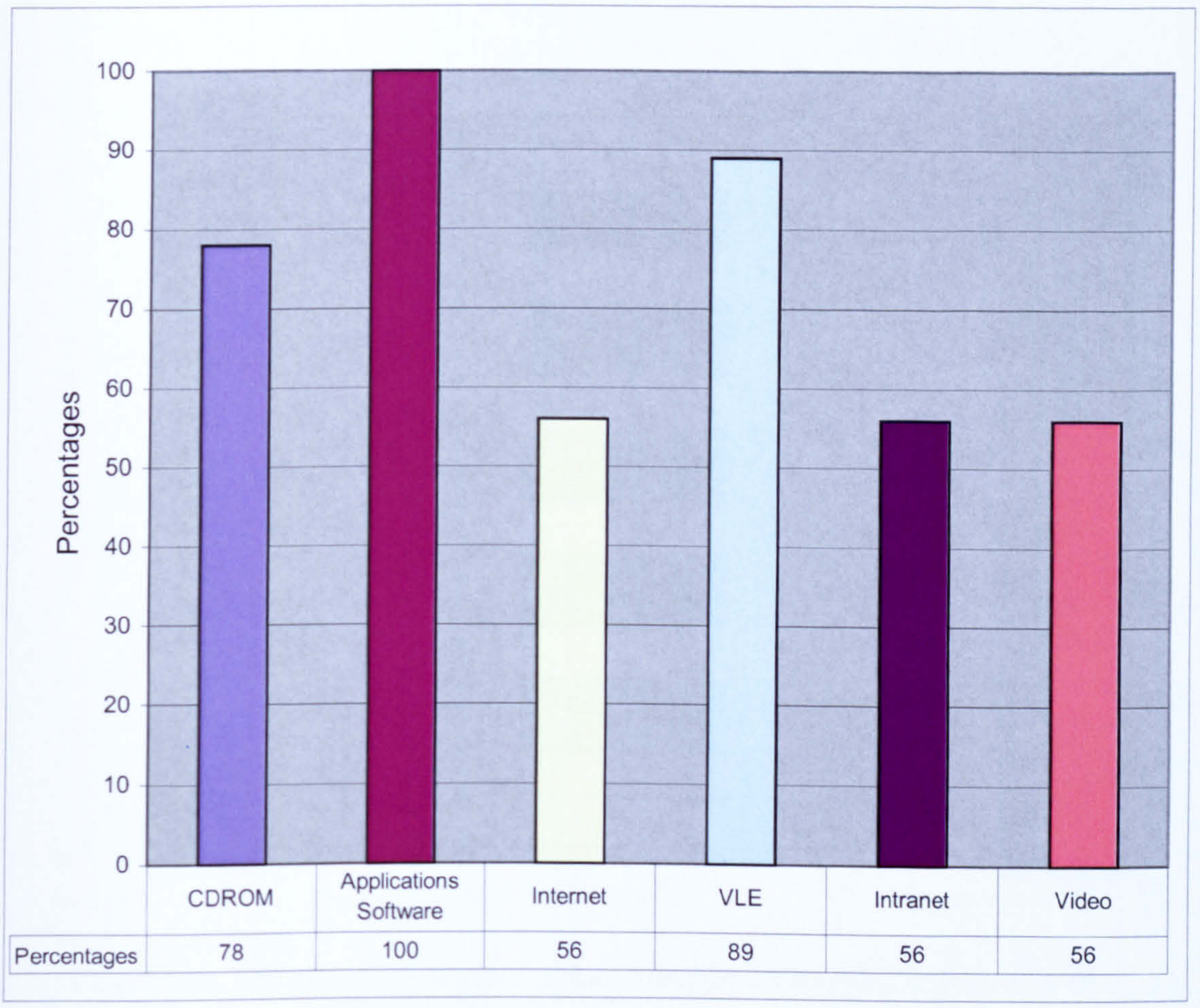
the FE colleges. Moodle and WebCT were the most popular VLEs used by FE colleges to deliver e-learning materials, followed by Blackboard, LearnWise and Technical. As for applications software, the most commonly used were Words and PowerPoint. Apart from these two, there were seven more applications packages which were commonly used by the FE colleges: Microsoft Tutorials, Spreadsheets (Excel), Cam Studio, Producer, Athlete Viewer and Target Skills. The applications software were used for three main purposes: as a subject in its own right or as part of Key Skills; as a tool to produce e-learning materials; and as mode of delivery of e-learning materials. Please refer to Figure 4.2 which demonstrates the role of applications software in post-16 teaching and learning in the selected FE colleges.

Table 4.3: The mode of delivery of e-learning materials used in selected FE colleges in the West Midlands

Colleges	**Mode of delivery of e-learning materials**						**Remarks**
	CDROMS	**VLE**	**Applications software**	**Intranet**	**Internet**	**Video**	
College A	√	√ Blackboard	√ (i) Word (ii) Microsoft Tutorials	--	√	√	
College B	√	√ Moodle	√ (i) PowerPoint (ii) Word	√	√	--	From LearnWise they changed to Moodle.

College C	--	√ Web-CT	√ (i) Word (ii) PowerPoint	--	√	√	
College D	√	√ Web-CT	√	√	--	--	
College E	√	√	√ (i) Word (ii) PowerPoint (iii) Spreadsheet (iv) Excel (iv) Cam Studio Producer (vi) Athlete Viewer	√	√	√	
College F	√	√ Web-CT	√ Target Skills	--	√	√	
College G	√	--	√ PowerPoint	√	--	√	Going to use Moodle (VLE)
College H	--	√ Moodle	√	--	--	--	From Technical they changed to Moodle.
College I	√	√	√ PowerPoint	√	--	--	Going to use Moodle.

Note: The above data were extracted from the results of the semi-structured interview survey.



Percentages	78	100	56	89	56	56

Figure 4.1: The mode of delivery of e-learning materials used in selected FE colleges in the West Midlands.

Note: The above data were extracted from the results of the semi-structured interview survey.

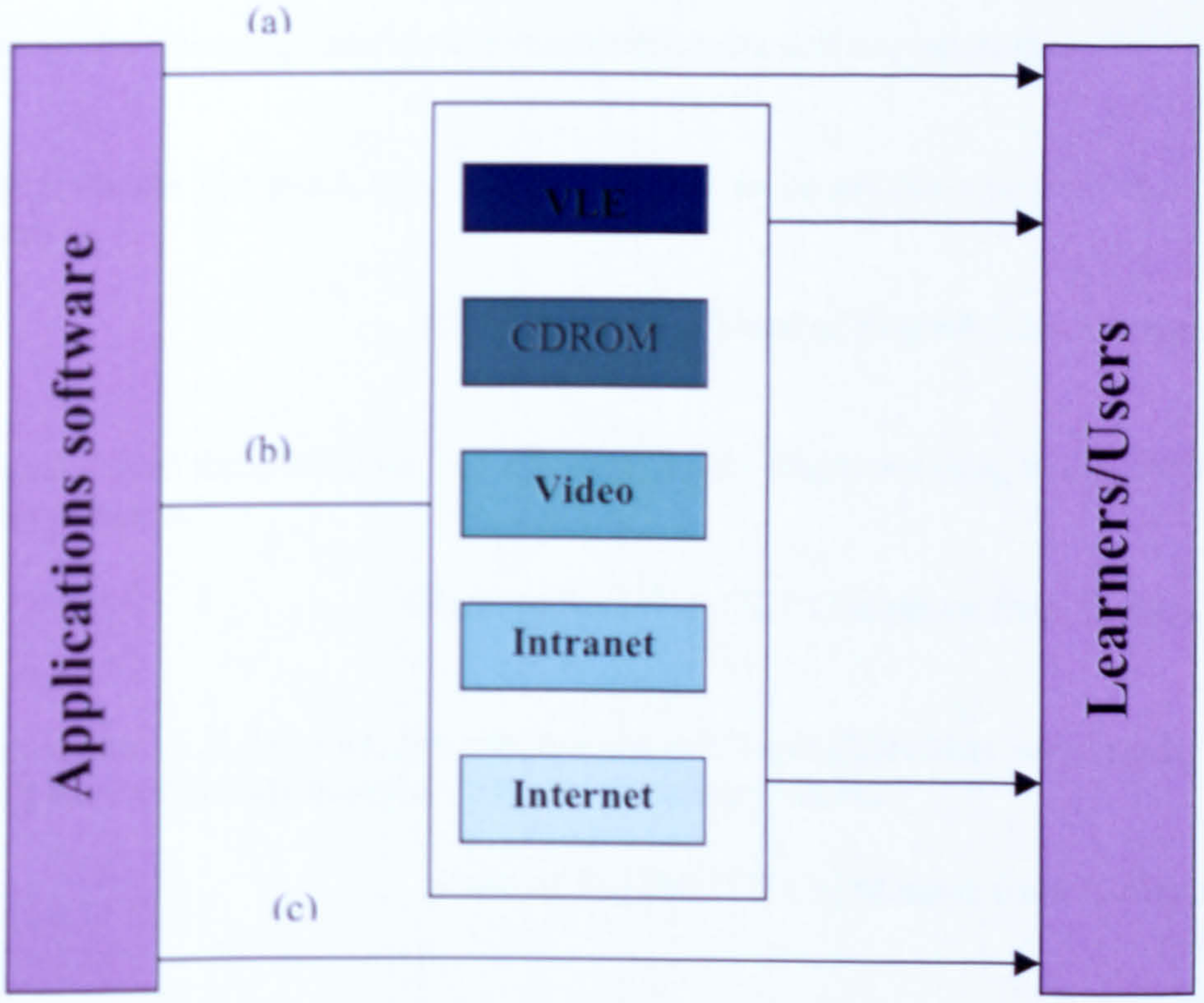


Figure 4.2: The role of applications software in post-16 teaching and learning in FE colleges. (a) Applications software were used as a subject or as part of ICT subjects (Key Skills) or as an area being taught during the induction sessions (teaching students the basic skills in using software packages). (b) Applications software were used to produce e-learning materials, which were then delivered through VLE, CDROM, video, Intranet and Internet. (c) Applications software were used to deliver e-learning materials in teaching and learning.

An investigation into the mode of delivery of e-learning materials used in FE colleges has suggested that although 78% of the sample used CDROMs, the level of use varies among FE colleges and departments within those colleges. Compared to VLEs and

applications software, the use of CDROMs was somehow limited in most FE colleges as indicated by the following interview extracts which are self-explanatory:

> CDROMs are not much used. Some subjects make greater use of it than the others.
>
> (ILT Coordinator/Head of English from College B)

> We have used the CDROMs, but not very much. There are only two CDROMs in my subjects.
>
> (Head of Sociology/ILT Champion from College B)

> We use the VLE, Internet, Intranet but we don't use CDROMs very much; we don't have CDROMs materials through the library access."
>
> (Head of English/ILT Coordinator from College E)

> Most of the materials, which the students used, are on the server (VLE), rather than on CDROMs, but there are some CDROMs.
>
> (E-learning Coordinator from College A)

> There are materials on CDROMs, which are installed on machines (computers) in various areas of the college. We try to avoid CDROMs if we can, but that was not always possible. So there is quite a bit of materials on CDROMs in college.
>
> (ILT Coordinator from College F)

Having identified the most commonly used modes of delivery of e-learning material in FE colleges, it is important for us to bring up some important issues that relate to the designing and delivery of e-learning materials. Sadler-Smith and Smith (2004) found that historically, instructional design strategies have been used to develop e-learning materials and that this approach have assumed that the target groups of learners will

display uniformity in the ways in which they process and organise information. This approach was however subjected to criticisms on the ground that:

- it neglects the important aspects of individual differences in cognitive style and instructional preferences.
- it neglects the diversity of learning styles and the fact that the different modes of delivery would appeal to different learning styles.

A flexible learning philosophy on the other hand refers to modes of delivery such as e-learning which enable learners to acquire job-related knowledge and skills at a time, place, pace that is commensurate with their own particular circumstances (Sadler-Smith and Smith, 2004).

4.3.2 Prevalence of VLE Use as Mode of Delivery of E-learning Materials

It was noted that all the FE colleges studied used the VLE to deliver e-learning materials, except for one college which nevertheless confirmed that they too are going to use the VLE to support and supplement traditional teaching in the classrooms and as a learning reinforcement tool outside classrooms:

> We are currently putting Moodle into situation with the view of opening a portal for outside use next year (2006). I am already piloting a system of sending and receiving assignments, marking them and sending them back.
>
> (ILT Champion from College G)

There could be many reasons which contributed to the prevalence of VLE use as mode of delivery of e-learning materials among FE colleges. The results from the interviews

have suggested that the VLE has many outstanding features which has influenced FE colleges to use them. The Vice Principal for Curriculum and Quality from College A for example cited two attractive features of Blackboard (interactive and easy to use) as indicated by the following interview extracts:

> We have got VLE, which is used in college called Blackboard and all courses have some elements of online materials through the college VLE. Mostly all are online materials. Blackboard is easy to use.

> Every course in the college will be using Blackboard for a minimum specification and more programs will be using Blackboard for its more interactive features and more interactive learning.

As can be seen from the above extracts Blackboard was chosen because it is *easy to use* and has *interactive* features. It is only practical for FE colleges to choose a mode of delivery which is easy to use to avoid spending a lot of money on hands-on-training and on-the-job training if they were to bring in new technologies which are sophisticated but difficult to use. And also, an interactive mode of delivery is considered to be the right choice as they are able to create interesting and more meaningful learning environments, both for the tutors and the students.

It was noted from the interviews that respondents were also attracted to the traceability features of VLE when considering the *right mode* to deliver e-learning materials in their respective colleges:

> Moodle is an open-sourced software. The advantage of Moodle is that we can track whether the students use it, when they use it, how long they use it for, and how many students use it. So basically, we can point individual students to use the Moodle materials and see whether they actually did it. It is very good.
>
> (Head of Sociology/ILT Champion from College B)

> The majority of our e-learning materials is delivered through the VLE. Some of the e-learning materials are delivered via websites (Internet), but the vast majority of it (90%) are sent through the VLE because of its traceability feature. So we track students' activity, which is not possible if we use CDROMs, e-mail (Internet) or any other methods. So we are certainly encouraging the use of VLE.
>
> (E-learning Manager from College C)

The above extracts highlight another feature of the VLE i.e. its traceability feature, which cannot be found in CDROMs, the Internet, or any other mode of delivery of e-learning materials. By using the VLE, the tutors are able to track the students' activities and at the same time they can encourage those students who have not use the VLE to start using it. With that kind of information, tutors and the college administrators can take necessary actions to improve the VLE usage among students in FE colleges. *Open-sourced software* was another factor which contributed to the prevalence of the VLE use as mode of delivery of e-learning materials. However it is important to clarify here that based on this investigation into the mode of delivery of e-learning materials used in FE colleges, with the exception of Moodle, the rest of the VLEs are commercial products which are costly to purchase and to maintain. So in this aspect, *open-sourced software* is only relevant to Moodle and not otherwise.

Evidence from the interviews has also suggested that the other advantages of using the VLE as mode of delivery of e-learning materials were directly linked to its nature which are: *accessible from anywhere*; has a lot of tools and contents; and can be used to personalise the students' learning preferences. The following interview extract serves as evidence to support the above claim:

> WebCT is just like any other manufacturer's name, such as Blackboard, LearnWise and other similar system. Basically it allows us to do work from anywhere within the internal connection, in a different country or whatever. They (the students) can access the learning materials and do online tests as well as having their assignments checked. WebCT has a lot of tools and a lot of contents. It's up to them (tutors) which tools they decided to use for their courses. It's also about personalising the students' learning preferences. So if you are making a lot of materials available online for WebCT, then you can actually personalise each person's pace.
>
> (ILT Development Manager from College D)

We have discussed some of the outstanding features of the VLE which influenced FE colleges to use them as mode of delivery of e-learning materials. Apart from the already mentioned features, there are still a few more attractive features of the VLE as highlighted by the following extracts:

> In the VLE, there are some courses which run online assessments and online quizzes; usually more of self learning exercises for students' revision time. Assessments on Blackboard are actually used to assess students, that kind of thing. Sometimes lecturers use e-learning materials in their lessons, direct to their students and including online assessments. Other times, they will be posting information for learning through the VLE, so that students can access after lessons.
>
> (Vice Principal for Curriculum and Quality from College A)

> Now we have Moodle. All departments have started to use Moodle and some of them are using it regularly to set home works, writing quizzes, etc. For Moodle you can organise your contents, and to some extent it has content creation in terms of quizzes and tests and setting up forums.
>
> (ILT Coordinator/Head of English from College B)

The first extract highlighted the main functions of the VLE, such as conducting online assessments and online quizzes, which can be used as self-learning exercises for

students' revision time. It has also included the role of VLE as learning reinforcement tool outside classrooms (tutors posting information for learning through the VLE, so that students can access after lessons). As for the second extract it highlighted the attractive features of Moodle, which enable tutors to organise contents; and to some extent it has content creation which allows tutors to not only organising online quizzes and tests but able to set up forums as well.

The most significant points emerge from this section are:

- The VLEs were widely used by the tutors in FE colleges as mode of delivery of e-learning materials.

- The attractive features of the VLE are:
  - interactive
  - easy to use
  - traceable
  - accessible from anywhere
  - has a lot of tools and contents
  - can be used to personalise the students' learning preferences
  - can be used as self learning exercises for students' revision

The VLEs use can be linked to the learning theories of Merriam and Caffarella (1991) which argue that:

- The humanist views individuals as seeking self-actualisation through learning, and being capable of determining their own learning.

- The constructivist stresses that all knowledge is context bound and that individuals make personal meaning of their learning experiences through internal construction of reality and emphasise the importance of changing oneself and the environment.

It could be argued that the VLEs are humanistic in nature as they allow students to develop their own learning independently. However the VLEs could also be constructivist in the sense that they allow learners to internally construct reality. Bruner (1965) on the other hand characterised constructivist as individual who see knowledge acquisition as an active process.

4.3.3. The Strengths and Weaknesses of the Modes of Delivery of E-learning Materials Used

We have discussed the mode of delivery of e-learning materials used in Section 4.3.1 and the prevalence of VLE use as mode of delivery of e-learning materials in Section 4.3.2. This section will discuss the findings on the strengths and weaknesses of the modes of delivery of e-learning materials used by FE colleges as learning tools. It was noted from the interviews that the Internet and the VLE were regarded as the primary sources for students and tutors to search and select information and to access the free online learning materials, but both at a disadvantage of being 100% reliant on the network and the system. The college's Intranet on the other hand, is subjected to limited coverage and accessibility as compared to the Internet and the VLE, which are accessible from anywhere. It was also noted that unlike PowerPoint (Application Software), the college Intranet is not suitable for playing movies because such activities

will slow down the system. Despite of the above limitations however, these modes of delivery of e-learning materials were considered as very useful for their multi-tasking capabilities: can be used to carry out research activities; conduct online assessments, conduct online quizzes; can be used to support and supplement traditional teaching in the classrooms; and also as learning reinforcement tools outside classrooms. The following interview extracts highlight the strengths and weaknesses of the mode of delivery of e-learning materials used in FE colleges as perceived by the participants:

> Many of the students have a very mature approach of selecting information from the World Wide Web (Internet) and they are also very good at using the VLE to find information and online learning.
>
> (Vice Principal for Curriculum and Quality from College A)

As we can see from the above extract, the Internet and the VLE currently play a very important role as the main sources for students and tutors to find and select information relevant to their courses. This information was considered important as it can help the students with their coursework, assignments, research projects, or even to the extent of completing their homework. Apart from finding information, the students used the VLE and the Internet to search for online learning materials, which they can use to prepare for their tests and examinations.

Despite the above strengths, the Internet and the VLE are subjected to system-related problems (relying 100% on the network and the system) and this was seen as their limitation as mode of delivery of e-learning materials as indicated by the Head of Physical Education from College E and the ILT Manager from College H:

If we use the Internet and if the system is down we can't teach.

(Head of Physical Education from College E)

The only problem that we had is system failure. But that's the main difficulty, you know. If you get a system failure, the network goes down and if you planned the lesson to use VLE, it can cause problems.

(ILT Manager from College H)

Both extracts indicated to us that since the VLE and the Internet are relying 100% on the network and the system, the tutors could not use them to teach once the network goes down or when there is system failure. So when this happens the tutors have to switch to the traditional learning method instead of the blended learning approach as originally planned.

In Section 4.3.1 it was revealed that the most popular mode of delivery of e-learning materials was applications software, followed by VLE and CDROMs. Although the Intranet and the Internet were found to be quite actively used by tutors and students in FE colleges, they were not as popular as the other three modes of delivery. Results from the interviews have suggested that the college Intranet is subjected to limited coverage and accessibility, compared to the Internet and the VLE; which are accessible from anywhere. The Intranet was also found to be unsuitable for playing movies, as it slowed down the system. The following interview extracts explain some of the limitations of the Intranet as mode of delivery of e-learning materials in FE colleges:

We have originally some materials on the college Intranet, but now we put them on the website (Internet). So students can access at home, so they don't have to be in college to use it. We did have problems and which is why we put them on the Internet, so that they (e-learning materials) would be more accessible. And

now we are moving some stuff to the VLE, but most of our materials in Sociology are still in the Internet.

(Head of Sociology/ILT Champion from College B)

The college Intranet is used as a VLE but the current problem with our Intranet system is that there is no external access.

(ILT Champion from College G)

> We use the VLE in college. But the college is in a dilemma now whether it's going to go more for the Intranet or the VLE. We are currently using them both, but predominantly the Intranet. Unfortunately the Intranet can't play movies because it slows the system. So the PowerPoint (applications software) is more useful.

(Head of Physical Education from College E)

The first and the second extracts highlight the problems faced by tutors when they use the college Intranet to channel e-learning materials and course information to students. The main problem of the Intranet system is that there is no external access other than within the college buildings. This will definitely pose problems for students, as they have to be in college to use the Intranet; whether or not they have classes or any activities on that day. Unlike the college Intranet, students can access the same materials from the Internet as and when required (regardless of the time and place) as long as there is an Internet connection. As for the third extract, we note that although the respondent from College E confirmed that his college used the Intranet more than the VLE; and yet in certain areas he finds application software is more useful and practical to use as a mode of delivery of e-learning materials.

The learning styles model of Honey and Mumford (1986) can be used here to check how does the use of different e-learning strategies relate to the different learning styles of the students. Honey and Mumford argued that once the learning preferences have been identified, learners are in better positions to select learning experiences that suit their styles. Under this model, learners are categorised under four different learning styles: activists; reflectors; theorists and pragmatists.

Knowledge of learning styles can be used to increase the self-awareness of students and tutors about their strengths and weaknesses as learners. However being knowledgeable about their own learning and that of others was found to be insufficient. It was argued that matching was linked with improve performance (Ford and Chen, 2001) and that is why it was recommended that the learning styles of students should be linked to the teaching styles of their tutor, known as the matching hypothesis.

In contrast, it was argued that learning is so complex that it is unlikely to be captured by any set of learning styles dichotomies (Roberts and Newton, 2001). Gregorc's (1984) believes that even those individual with strong preferences for particular learning styles preferred a variety of teaching approaches to avoid boredom. It was also argued that the main educational objectives of mismatching are personal growth and creativity of the learners themselves (Kolb, 1984).

The question is now, how does the use of ICT help with the matching and mismatching hypothesis? The investigation results have shown that the use of e-learning materials was indeed a helpful way to address the matching and mismatching hypothesis among

the learners and tutors in FE colleges. The benefit of ICT and e-learning materials in relation to the above issue can be seen in the following circumstances:

- E-learning materials are interactive learning tools that allow tutors and learners to interact with each other better. Learners will become more active participant, free to give ideas and not afraid to ask questions during classroom's teaching.

- E-learning materials enable tutors to personalise the students learning preference and hence provide an opportunity for them (tutor) to match their teaching style to the learning styles of their student.

- E-learning materials provide the tutors with aides to continue stimulating the students.

- E-learning materials stimulates and interests the students and they offer variations to teaching.

Point 1 and 2 above are directly related to the issues raised by Ford and Chen (2001). Point 3 and 4 on the other hand offers suitable solutions to the arguments put forward by Gregorc's (1984) and Kolb (1984). The above issues (benefits of ICT and e-learning materials) will be discussed further in Chapter 5, Section 5.4.3.

The most significant issues in Section 4.3 are:

- The most commonly used modes of delivery of e-learning materials in FE colleges were CDROMs, Virtual Learning Environments (VLEs), applications software, Intranet, Internet and Videos.

- Applications software was the most popular mode of delivery of e-learning materials used, followed by VLEs, CDROMs, Intranet, Internet and Videos.
- VLE has becoming increasingly popular as a mode of delivery of e-learning materials in FE colleges due to its many outstanding features (interactive, easy to use, traceability features, accessible from anywhere, has a lot of tools and contents, can be used to personalise the students' learning preferences, etc.)

- The strengths and weaknesses of the modes of delivery of e-learning materials can be seen as follows:

The Internet and VLE

- As an important source for students and tutors to search and select information and to access the free online learning materials.

- Accessible from anywhere.

- Subjected to system related problems, as it is relying 100% on the network/system.

The college Intranet

- Subject to limited coverage and accessibility.
- No external access.
- Not suitable for playing movies (films).

Applications Software

- Suitable for playing movies.

4.4 The Primary Sources of E-learning Materials Used

Investigation into the range of settings in which e-learning materials are used in post-compulsory education and the modes of delivery of e-learning materials used has revealed that there are many sources from which FE colleges could obtain the supply of e-learning materials to teach their students. Results from the interviews has suggested that the primary sources of e-learning materials used by FE colleges include the following: self-developed materials; materials purchased from commercial suppliers; materials obtained through external commissions; free online materials accessed from websites (Internet); nationally produced materials which were provided free by the National Learning Networks (NLN), Learning and Skills Development Agency (LSDA), Further Education Resources for Learning (FERL), Joint Information Systems Committee Regional Support Centre (JISC) and etc; shared materials from the Regional Repositories; materials obtained through collaboration with other colleges; materials obtained through an Exchange for Learning Projects; and materials purchased from the Association of Colleges.

However it was noted that the majority of FE colleges used e-learning materials from the following sources: self-developed materials, materials purchased from commercial suppliers, free online materials from the Internet; and the nationally produced materials from NLN, LSDA, FERL and JISC since100% of the FE colleges studied confirmed that they obtained e-learning materials through these sources. The second most popular source of e-learning materials was through the Exchange for Learning Projects, of which 56% of the sample indicated that they obtained their e-learning materials from this channel. The e-learning materials used by FE colleges were also commonly

obtained from the Regional Repositories and through collaboration with other colleges with 33% of the sample used them for their e-learning supply. The least popular sources of e-learning materials were the Association of Colleges and also from individuals who were independently commissioned by FE colleges to develop e-learning materials for their curriculum use. Please refer to Table 4.4 for a summary of this information.

Table 4.4: The primary sources of e-learning materials used in selected FE colleges in the West Midlands

Colleges	Self-developed materials	Purchased from commercial suppliers	Commissioned people to develop	Free online materials from the Internet	Free materials from NLN, LSDA, FERL, JISC	Shared materials from Regional Repositories	Collaboration with other colleges	Exchange for Learning Projects	Association of colleges
College A	√	√	--	√	√	--	--	√	--
College B	√	√	--	√	√	--	--	--	--
College C	√	√	√	√	√	√	√	√	--
College D	√	√	--	√	√	√	√	√	--
College E	√	√	--	√	√	--	--	--	--
College F	√	√	--	√	√	--	√	√	√
College G	√	√	--	√	√	--	--	√	--
College H	√	√	--	√	√	√	--	--	--
College I	√	√	√	√	√	--	--	--	--

Note: The above data were extracted from the results of the semi-structured interview survey.

4.5 The Commercially-produced versus Self-developed E-learning Materials

Evidence from the interviews has suggested that the self-developed materials, materials purchased from commercial suppliers, free online materials from the Internet and the

nationally produced materials from NLN, LSDA, FERL and JISC were considered to be the most popular sources of e-learning materials used by FE colleges, as discussed in Section 4.4. This section will discuss the arguments for the commercially-produced as against the self-developed e-learning materials used in FE colleges and vice versa.

It was noted that most FE colleges purchased e-learning materials rather than developed them themselves in-house, mainly because of the time factor and in certain cases due to lack of expertise as commented by the ILT Champion from College G:

> Some of us do, yes. Not enough people are trained to do it though.

In most cases tutors will only develop their own materials if they cannot find them in the market. The other reason for them to develop their own materials was to cater for a very specialist course like Podiatry of which the e-learning materials has very few outlets. Apart from developing their own materials and/or purchasing materials from commercial suppliers it was noted that some tutors repurposed (modified) others' materials to save time if they were to actually develop new materials themselves as indicated by the following interview extracts:

> To produce good quality interactive materials take a lot of time, not only our time but also the time of the tutor to produce the storyboard. So it can often take a long time for a project (produce own materials) to finish. So we can't produce that many. We have to buy so many as well. We tend to stick with specific projects that we can't find the materials in the ultimate market place. If we can buy it, I think buying is a better option.
>
> (ILT Development Manager from College D)

> Yes we do design some of our own e-learning materials, particularly for a very specialist course; say like Podiatry; or something like that which has very few

outlets at the moment. Or what we are trying to do is more than designing our own, but to *repurpose* people's materials as much as possible, to save our work.

(E-learning Manager from College C)

We buy and then we copied, pasted and inserted it in our own presentation. We searched from Google (Internet) if we want some pictures; but there are some super software that we can buy.

(Head of Physical Education from College E)

On the other hand, developing their own materials was considered to be the best option available for some FE colleges due to certain factors. The main reason was to obtain e-learning materials which were tailor-made to the tutor's requirements (more interactive and animated) as suggested by the ILT Manager from College H:

> Basically, the majority of the materials we are using were produced in-house. They were designed specifically alongside the lecturers involved in the courses. They wrote the wording and questionnaires involved and developed them and pushed that forward so much as making it interactive, making it animated and giving it as much clause (phrase) as possible.

Apart from getting exactly what they want from self-developed materials, the common reasons which influenced FE colleges to develop and produce their own materials, were to avoid certain problems/difficulties when they used the e-learning materials purchased from commercial suppliers. It was revealed that sometimes the commercial materials were felt to be expensive, inflexible, very slow and difficult to use, inappropriate to needs, and incompatible with the delivery system, as indicated by the following interview extracts:

> LearnWise is a commercial product, which cost a lot of money, is very slow and difficult for people to use.

(Head of Sociology/ILT Champion from College B)

> There are always problems. If the materials are not standard-based, then there are problems (in delivering the materials).
>
> (ILT Coordinator from College F)

> There are also problems with incompatibility. In the WebCT, that's where we hose (channel) most of our materials, not all materials the company produced are compatible with the e-learning environment. Sometimes we have to modify them or sometimes they just do not work. And so there are still quite a bit of problems nationally, in the standards that everybody would agree on, as to what goes on to the VLE.
>
> (ILT Development Manager from College D)

The most significant issue in Section 4.5:

- Most FE colleges purchased e-learning materials rather than developed them themselves because of the following reasons:
  - Time factor
  - Lack of expertise

- In most cases tutors would only develop their own materials if:
  - They could not find the materials in the market
  - To cater for a very specialist course like Podiatry.
  - To obtain materials which were tailor-made to the tutor's requirements
  - To avoid certain problems and difficulties if they were to use the e-learning materials purchased from commercial suppliers.

- Some tutors repurposed (modified) others' materials to save time and money.

4.6 Conclusions

This chapter has presented the findings on the range of settings in which e-learning materials are used in post-compulsory education and the mode of delivery of e-learning materials used. Under Section 4.2 the thesis has identified the *curriculum areas*, which used e-learning materials, the *main curriculum areas*, which used e-learning materials, and the extent to which e-learning materials are used on these curriculum areas. Section 4.3 on the other hand discussed findings on the mode of delivery of e-learning materials used, prevalence of VLE use as mode of delivery of e-learning materials and the strengths and weaknesses of the different modes of delivery. Section 4.4 disclosed findings on the primary sources of e-learning materials used while Section 4.5 provided arguments for and against the commercially produced e-learning materials with those that were self-developed by the selected FE colleges in the West Midlands.

Chapter 5

Findings: The Ways in which E-learning Materials are Used and the Implications for the Pedagogy of E-learning Materials in Post-compulsory Education

5.1 Introduction

The aim of this chapter is to present the findings on the ways in which e-learning materials are used and consequently the implications for the pedagogy of e-learning materials used in FE colleges

This chapter is structured as follows: Section 5.2 investigates the ways in which e-learning materials are used across the college. This section seeks to examine the purposes for which e-learning materials are used: whether they are used for online assessments and quizzes; for simulation purposes (in this context simulation is participatory in the sense that it is used interactively such as modeling electrical installation processes); for learning reinforcement outside classrooms; for research and assignment supports; for demonstrating skills and for practical skills; and for delivering online materials and supplementary information to students. Section 5.3 examines the ways in which e-learning materials are being applied in teaching and learning situations in the selected FE colleges. The main areas of focus in this section are as follows: whether e-learning materials are used for a whole session or part of a session; whether

they are used with the whole class or in groups; and whether they are used on demand by students or whether their use is planned by teachers.

Section 5.4 investigates the implications for the pedagogy of e-learning materials in post-compulsory education i.e. how teachers' practice may influence aspects of learning. This section is divided into six sub topics, namely aspects of the syllabus for which e-learning materials are particularly suitable; the effectiveness of the e-learning materials; reasons for using the e-learning materials; sources of evidence that the e-learning materials enhance learning; potential effects of not using the e-learning materials; and the relationship between e-learning materials and the learners' learning styles. Section 5.5 concludes and summarises the overall presentation of Chapter 5.

5.2 The Ways in which E-learning Materials are Used in Teaching and Learning

An investigation into the ways in which e-learning materials are used in teaching and learning has indicated that there were seven main areas in which e-learning materials are being actively used. It was found that the e-learning materials were mainly used for the following learning activities: to support and supplement traditional teaching and learning in classrooms; as learning reinforcement outside classrooms; for conducting online assessments and quizzes; for simulation purposes; for research and assignment supports; for demonstrating skills and for practical skills and for delivering online materials and information to students. When the uses of e-learning materials were investigated, it was found that all the FE colleges used them for support and as supplementary to traditional teaching and learning in classrooms, for learning

reinforcement outside classrooms, for conducting online assessments and quizzes, for research and assignment supports and for delivering online materials and information to students. Apart from that 67% of the respondents indicated that they used e-learning materials for simulation purposes and another 44% used them for demonstrating skills and for practical skills. Please refer to Table 5.1, which summarises the ways in which e-learning materials are used in FE colleges.

Table 5.1: The ways in which e-learning materials are used in teaching and learning in selected FE colleges

Colleges	As support and supplementary to traditional teaching and learning in classrooms	Learning reinforcement outside classrooms	Online assessments and quizzes	Simulations	Research and assignment's support	Demonstrating skills and for practical skills	Deliver online materials and information to students
College A	√	√	√	-	√	√	√
College B	√	√	√	-	√	-	√
College C	√	√	√	√	√	-	√
College D	√	√	√	√	√	-	√
College E	√	√	√	-	√	√	√
College F	√	√	√	√	√	√	√
College G	√	√	√	√	√	-	√
College H	√	√	√	√	√	√	√
College I	√	√	√	√	√	-	√

Note: The above data were extracted from the results of the semi-structured interview survey

An important observation from the results presented above is that e-learning materials are mainly used to support and supplement traditional teaching and learning in the classrooms (blended learning) and not to replace them. The following interview extract serves as evidence to that effect:

> There is virtually no use of e-learning to replace traditional learning. It's merely all used to support and supplement learning. Sometimes it is integrated with traditional learning and sometimes it's purely supplementary. Sometimes lecturers use e-learning materials within their lessons, directly with their students. This includes online assessments. Other times, they post information through the VLE, so that the students can access them after lessons. So there is a mixture.
>
> (Vice Principal for Curriculum and Quality from College A)

Due to the large number of courses conducted in most FE colleges, there is a wide variety of usage for e-learning materials. That is why they do not have a single policy on how e-learning materials should be used. As a college they encouraged their staff to use e-learning materials in as many ways as appropriate. This view was equally shared by the ILT Development Manager from College D,

> … it stands on the individual tutors. It's up to them which tools they decide to use for their courses. We don't keep tight what the students do. So it's very much in the hands of the individual tutors. It is very varied really.

Apart from supporting and supplementing traditional teaching and learning in classrooms, e-learning materials were mainly used to reinforce learning outside classrooms as highlighted by the following interview extracts:

> The electronic materials help with their delivery or they (tutors) can put it on the WebCT for students as further reading outside the lessons.
>
> (ILT Development Manager from College D)

> They (the e-learning materials) are obviously used for learning back-ups, for referrals, revisions and as in-class teaching aides.
>
> (ILT Manager from College H)

I think we can consider most of it is used to reinforce learning.

> (ICT Services Manager from College I)

> Anytime you use the equipment in the classrooms, you get the students interested, rather than just reading it from the books, because they immediately find the use of technology interesting.
>
> (Head of English/ILT Coordinator from College E)

A particularly insightful comment in relation to how students are perceived to view the use of e-learning came from the same interviewee

> It is not in the imagination, it represents facts. So in terms of reinforcing learning I think it is a very motivating thing to do.

We have discussed two main areas in which e-learning materials are being actively used, namely to support and supplement traditional teaching and learning in classrooms and as learning reinforcement outside classrooms. We will now focus on the other three areas in which e-learning materials were actively used as learning tools: online assessments and quizzes; research and assignment supports; and online materials and online information for students. Evidence from the survey's interviews has suggested that e-learning materials play an active role in these areas as can be reflected by the following interview extracts:

> We use them for all areas of teaching, but the extent of its use is difficult to assess. For example we are doing more and more online assessments now, not just for our own internal assessments but also for the examination boards.
>
> (ICT Services Manager from College I)

Firstly it is used for delivering materials and information to students. Secondly, giving the students the information to grasp the structure of the activity and as a source of materials to carry out research. Then using the computer's software to put together their assignments which result from the research they have done.

(Head of English/ ILT Coordinator from College E)

I use email (Internet) heavily for assignment support. That's a growing area at the moment.

(ILT Champion from College G)

E-learning materials were also found to be actively used for simulation purposes and for demonstrating skills and for practical skills. In certain aspects, the e-learning materials were actually used as a way of doing things which would not be possible if teachers were to rely on conventional learning methods as indicated by the following interview extract:

They were used for demonstrating skills and for practical skills. They were also used for simulations quite extensively. It is actually used as a way of doing things, which you can't do with the conventional learning methods, for example the use of images, sounds, videos, movements, etc. So that's where they are actually being used.

(ILT Coordinator from College F)

A particularly perceptive comment from the same interviewee was:

They are used in ways to bring in new media to give a new dimension to learning.

The most significant issues to emerge from this section are:

- There was some evidence that teachers prefer to use e-learning materials in a student-centred fashion.

- Teachers felt that a benefit of e-learning materials is that they facilitate immediate engagement with learning.

- A particularly interesting quote suggested that students put more credibility on information provided electronically.

- One teacher emphasised that e-learning provides a new dimension to the learning process.

It was very interesting to note that all these issues were positive in relation to the potential for e-learning materials to enhance learning. The potential for using them in a student-centred way was evident. Teachers appear to recognise the benefits of the student-centred approach (Race, 1998), which enables mistakes to be made in private, rather than in public. The e-learning environment can be beneficial here as the relationship is between computer and learner and the consequences of mistakes are very limited. In contrast, the teacher-centred approach views the student as a passive recipient and may not address higher-order learning (Kember and Kwan, 2000).

The last issue also relates to the second point on immediacy of learning. This suggests that enhanced engagement is taking place which may result in higher levels of motivation. So, in a behaviourist sense, the reward is a more immediate achievement and possibly higher self-esteem (Maslow, 1970).

The point that students place more credibility on information presented electronically appears to conflict with the idea that e-learning strategies open a new dimension for students, in that new and unfamiliar situations may result in suspicion over the information presented. However one possible explanation to this is that electronic media are more familiar to younger students and they are more receptive to information presented in this way.

The discussion above relates to BECTA's Ten Pedagogic Principles for E-learning in that e-learning strategies may be regarded as more inclusive (Principle 2) if they relate more to learners' life experiences (as such, learners are now more familiar with electronic media). Principle 3 emphasises the relevance of engagement while Principle 5 concerns with the importance of personalisation. Clearly if students have more control over their learning environments, then more personalisation would be achievable (BECTA, 2005).

In spite of the positive comments above, the role of the teacher in managing the electronic learning environment and the potential of the materials themselves remain crucial to the effectiveness of the learning experience.

5.3 The Ways in which E-learning Materials are being Applied in Teaching and Learning Situations

This study has also identified the ways in which e-learning materials are being applied in teaching and learning situations in FE context. Generally e-learning materials were used for part of a session, although 67% of the respondents confirmed using them for a

whole session in certain courses and subject areas. It was noted from this study that all the respondents indicated that they used e-learning materials with the whole class instead of in groups. Only 44% of the respondents confirmed using e-learning materials in groups as well as with the whole class. It was also found that the use of e-learning materials for classroom teaching was normally planned by the teachers and not otherwise (on demand by students). Please refer to Table 5.2, which demonstrates the ways in which e-learning materials are being applied in teaching and learning situations in the selected FE colleges.

Table 5.2: The ways in which e-learning materials are being applied in teaching and learning in post-compulsory education from selected FE colleges in the West Midlands

Colleges	Used for a whole session	Used for part of a session	Used with the whole class	Used in groups	Used on demand by students	The use is planned by the teachers
College A	√	√	√	√	√	√
College B	-	√	√	-	√	√
College C	√	√	√	-	√	√
College D	√	√	√	-	-	√
College E	√	√	√	√	-	√
College F	√	√	√	-	-	√
College G	√	√	√	-	√	√
College H	-	√	√	√	√	√
College I	-	√	√	√	√	√

Note: The above data were extracted from the results of the semi-structured interview survey

The three most significant issues here are:

- Some teachers indicated that they used ICT for part, rather than the whole sessions.
- The possible reduction in group work resulting from the use of e-learning materials.
- The indication by some teachers that the use of e-learning materials is not available on demand by students

There are some conflicts here that the last two points (mentioned above) suggest a relatively teacher-centred approach in the possible reduction in group work and lack of student choice in relation to the usage of e-learning materials. The notion that teachers prefer to use e-learning materials in a student-centred fashion would seem to be refined here in that the choice of learning methodology resides with the teachers and there is relatively little student input. However, once the decision has been taken by the teachers, the students then become more autonomous.

With regard to the first point, the issue of blended learning is important (Matheos, 2005). In this case blended learning might not mean using ICT in conjunction with other methods, but a variation on this being a blend of e-learning approaches. Kerres and Witt (2003) on the other hand consider that blended learning involves *content*, *communication* and the consequential *construction* of learning. The interaction between the components in the blend process would determine the direction of learning.

5.4 The Implications for the Pedagogy of E-learning Materials

This section will discuss findings on the implications for the pedagogy of e-learning materials in FE colleges. Six areas are addressed in this section: aspects of the syllabus for which e-learning materials are particularly suitable; the effectiveness of e-learning materials; the reasons for using the e-learning materials; evidences to show that the e-learning materials enhance learning; effects of not using the e-learning materials; and the relationship between e-learning materials and the learning styles of individual learners.

5.4.1 Is there a Particular Aspect of the Syllabus or Curriculum Area/Subject for which E-learning Materials are Particularly Suitable?

This study has shown that 67% of the FE colleges suggested that there is no particular aspect of the syllabus for which e-learning materials are particularly suitable as against 33% of them which indicated that there are certain courses and subject areas for which e-learning materials are particularly suitable.

The E-learning Coordinator from College A confirmed that all the courses in her college use the e-learning materials. This comment was supported by the ILT Coordinator/Head of English from College B, who believes that it all depends on the teachers and the nature of the subjects, what they plan to deliver and the type of contents they are trying to deliver. On this issue, all the respondents from College E unanimously agreed to the suggestion that the e-learning materials can be used in any syllabus and that as a college

they used e-learning materials as a whole. The college's Head of Physical Education had this comment:

> I think they can be used in any syllabus. So I think any area, which involved movements (moving images) obviously lend itself to this formal presentation. If something is flat and you do not need movement, you could use overhead projectors.

Similar responses were obtained from respondents from College H and College I as reflected by the following interview extracts:

> I don't think there is a particular aspect. We try to design (the e-learning materials) so that they will cover all aspects of the syllabus. It is up to the individual tutors on how they deliver.
>
> (ILT Manager from College H)

> Any part of the syllabus, by rights will be suitable for e-learning materials. In fact, if the question said it is not suitable, I don't think so.
>
> (ICT Services Manager from College I)

On the other hand, the E-learning Manager from College C suggested that e-learning materials are particularly suitable for Medical Sciences and Biological Sciences areas as they enable students to get visual effects which are crucial for these courses. Apart from Medical Sciences and Biological Sciences, Law is another area for which he felt that e-learning materials are particularly suitable. An ILT Coordinator from College F in turn confirmed that e-learning materials are particularly effective in vocational areas such as Construction, Engineering, Hair and Beauty and other practical vocational subjects. According to him, e-learning materials are also particularly effective in Basic Skills subjects as they allow the students to experience it themselves. Another positive

comment came from the ILT Champion from College G, who suggested that any subjects that come with Distance Learning content are suitable for using the e-learning materials. Other appropriate courses which he considered particularly suitable to use e-learning materials are: assessment and verification courses, teaching courses and caring courses. Please refer to Table 5.3 which presents the results of the interview survey on the question of whether there are particular aspects of the syllabus for which e-learning materials are particularly suitable.

Table 5.3: Is there a particular aspect of the syllabus or curriculum area/subject for which e-learning materials are particularly suitable?

College A	No particular aspect
College B	No particular aspect
College C	Medical Sciences Biological Sciences Law
College D	No particular aspect
College E	No particular aspect
College F	Vocational areas such as Constructions, Engineering, Hair and Beauty, and other practical vocational subjects Basic Skills subjects
College G	Distance learning courses Teaching courses Caring courses Assessment and Verification courses
College H	No particular aspect
College I	No particular aspect

Note: The above data were extracted from the results of the semi-structured interview survey

The most significant issues to emerge from this section are:

- The decision to use e-learning materials for any syllabus depends on the tutors; whether this is appropriate or not. In most cases FE colleges always encourage tutors to use e-learning materials in their curriculum areas.

- There was controversy about whether e-learning materials are more suitable with certain subjects than others, since 67% of the FE colleges suggested that there is no particular aspect of the syllabus for which e-learning materials are particularly suitable.

Many of the interviewees were responsible for planning the use of e-learning materials in the college. Although they have subject specialisation, their position is likely to result in bias. Since they have a cross-college role, they would be likely to favour and promote the use of technology and therefore unlikely to suggest that e-learning material is not appropriate for a particular subject. Furthermore, it is possible that teachers use e-learning resources because they are available. This is a significant point which implies that in FE colleges there may be a range of motivating factors involved in the process of teachers making decisions about whether to use ICT, rather than on solely pedagogic grounds. A methodological issue worth mentioning here is that interviewees did not have the questions in advance, so they may have given rather spontaneous answers. In future, it would be worth circulating the interview guide (written schedule) to familiarise participants with the questions.

A further issue relating to teachers' use of ICT in the classroom is the barrier resulting from their perceived lack of skills for using the technology (BECTA, 2004). The FE sector has historically been under-resourced with hardware, software and training for the use of ICT by teachers (Hoskyns, 2004). This has been the scenario despite the introduction of the *Standards for Information and Learning Technology* by the Further Education National Training Organisation (FENTO, 2001) and the consequent embedding of ICT training within post-compulsory teacher training courses.

The issue of *subject* described above is very important. The researcher propose that the opposing views on the relevance of subject on the use of ICT, relate to teachers' understanding of the term *subject* and the underlying assumptions that are made when making pedagogic decisions on when to use ICT resources. Teachers' judgment on whether *subject* is a relevant factor in choosing to use ICT may be based on their understanding of the concept. Some may view *subject* simply as a label, in which case they may state that *subject* is important. Others may view *subject* in terms of the set of skills involved and therefore judge that *subject per se* is not important.

5.4.2 How Effective is the E-learning Material as Learning Tool?

Evidence from the survey's interviews has suggested that the e-learning materials were considered to be an effective learning tool in the FE colleges studied since 100% of the respondents agreed on its effectiveness in the teaching and learning environment. Please refer to Table 5.4, which reflects all the positive responses from the interview respondents. It was interesting to note that all the respondents confirmed that the e-learning materials are *effective* learning tools, with some of them even considering them

to be very *effective*. There was one respondent from College E who considered the e-learning materials as *being more effective than traditional teaching*:

> E-learning allows me to make things move. Instead of flat objects, I can make them move. I think so, yes, definitely (they are effective). They enhance learning, more effective than traditional teaching.

Table 5.4: How effective are the e-learning materials?

College A	All the students tend to respond to them quite well (the materials are effective).
College B	Effective as learning reinforcements and for revision outside the classroom.
College C	The effectiveness of e-learning materials depends on how the tutors plan to use them. If they plan it correctly in order to use it to meet their learning outcomes, by definition they will be effective.
College D	The effectiveness of e-learning materials depends on how they were applied by the member of staff (tutors).
College E	They enhance learning. More effective than traditional teaching.
College F	Effective but you can't measure the effectiveness itself.
College G	From the students' survey it says very effective.
College H	It is very effective.
College I	It varied, depends on many variables. By and large the materials are effective, but you can't make a sweeping statement as to how it works.

Note: The above data were extracted from the results of the semi-structured interview survey

The Head of Sociology/ILT Champion from College B in turn gave an indication that the e-learning materials are effective for revision as they enable students to use structured materials outside classrooms and she finds the materials interactive. The ICT Services Manager from College I on the other hand contended that the effectiveness of e-learning materials depends on many variables. He argued that e-learning materials

could be considered effective if they match with the right skills requirements, if they are used at the right time, if they are used by the right teachers. He nevertheless agreed that the materials are effective and according to him the e-learning materials available were *normally good materials*.

According to the E-learning Manager from College C, the effectiveness of e-learning materials depends on how the tutors plan to use them. He viewed the learning materials as new tools for the tutors to use, and if they plan the use of e-learning materials correctly to meet their learning outcomes, then the materials would be effective. However if they just allow the students to wander through learning materials without any objective or purpose, then they will not meet their learning objectives and then it will not be effective.

An almost identical response was expressed by the ILT Development Manager from College D, who was inclined to believe that the effectiveness of e-learning materials depends on how they are applied by tutors. He argued that:

> If you have a good tutor who knows how to make the right use of e-learning materials and blend them within the other resources and methods (a blended learning approach), then the materials can be very, very effective. Accordingly if we have tutors who just put something on the VLE, for example, and just let their students to access and develop the computer's work, without making prior planning as to how they should be applied then, the materials are not always so effective.

We have seen how e-learning materials were duly acknowledged by the survey's respondents as effective learning tools. Nevertheless the effectiveness itself is very hard to measure and is subject to many variables as commented by the ILT Coordinator from College F:

> That is very hard to measure. There are many anecdotes. The whole experience is lots more enjoyable; both for lecturers and the students. That's how we know it has been effective. And I think the reason for that is because it is actually accommodating the learning styles of students. And that's why you can't measure the effectiveness itself.

There is a strong agreement in this section with the views expressed an overwhelming opinion that e-learning materials are effective at enhancing learning. A key point is that discussion (Section 5.4.1) on the relevance of skills sets to teachers' views of the use of e-learning materials is echoed in the comments from these interviews.

5.4.3 Why are E-learning Materials Used?

This section will discuss factors which influenced teachers in FE colleges to use e-learning materials in their respective colleges. Based on results from the survey's interviews, it was found that there were many factors which influenced tutors in FE colleges to use e-learning materials in teaching and learning. It was noted that apart from quoting reasons such as *the materials are interactive*, *a drive from the Government*, and *used as support to traditional teaching and learning*, the reasons given by each respondent were quite different from one another. Please refer to Table 5.5 to identify the specific reasons as to why e-learning materials are being used by the selected FE colleges.

Table 5.5: Why are e-learning materials used?

College A	Used as support to traditional learning
College B	The materials are interactive
College C	A drive from the government to use e-learning materials. They are easily accessible They can be used very effectively to make better use of resources/facilities available in the classrooms
College D	(i) Used to explain topics, hopefully it allows more students to understand the subjects. (ii) Enable tutors to personalise the student's learning preferences.
College E	(i) Used as support to traditional teaching (ii) Stimulates and interests the students. (iii) Variations to teaching
College F	(i) Used to include learners who are either excluded or not particularly switch on by the conventional method.
College G	(i) It is a government requirement (ii) Strongly believed that it can support and enhance learning
College H	They are interactive and easy to teach
College I	(i) Used to reinforce learning (ii) Provide opportunity for the students to learn after class (iii) Provide the teachers with aides to continue stimulating the students

Note: The above data were extracted from the results of the semi-structured interview survey

Under Section 4.2.3 (the extent to which e-learning materials are used on these courses) and Section 5.2 (the ways in which e-learning materials are used in teaching and learning) we have seen how the e-learning materials were mainly used as support and supplementary to traditional teaching and learning in the classrooms. So it came as no surprise to learn that College A and College E have indicated that they used the e-learning materials as support to traditional teaching and learning. The e-learning

materials were also used because of their ability to stimulate and interest the students as commented by The Head of Physical Education from College E:

> There are stimulations, there are interests, and there are movements. They (e-learning materials) are also varied. For example, the use of e-learning materials in movies can create new voices and stimulus for audience. So all of those are variations to teaching.

The interactive feature of the e-learning materials was another factor for FE colleges to use them in teaching and learning. The ILT Coordinator/Head of English from College B finds e-learning materials as good additional tools since they encourage students to interact with the teaching, in terms of their contributions during verbal discussion as reflected by the following interview extract:

> In teaching and learning, in terms of interactivity, I suppose most of it is going on through the Smart Board (interactive whiteboard), which is encouraging students to perhaps literally interact with the teaching, something like verbal discussion contributions. It's a good additional tool.

The ILT Manager from College H seems to agree with the above statement and argued that:

> They (e-learning materials) are interactive which are easy to teach.

The E-learning Manager from College C cited three main reasons which influenced them to use e-learning materials to teach their students. The first one is because there was a drive from the Government to use the e-learning materials and naturally in the best interests of everybody (students, tutors, college administrators etc.), they need to give their full support to the Government initiatives. The second reason is because there were a lot of e-learning materials available for use and therefore it was very easy for the

tutors to use them. The other reason is that the e-learning materials can be used very effectively to make better use of resources that they have. So if the tutors prepare their students before coming to the classrooms, then they (tutors) can actually get a more effective use of their facilities. Hopefully then, they will need less physical resources in order to actually gain effective learning.

The ILT Development Manager from College D on the other hand, identified two reasons which induced FE colleges to use e-learning materials. According to him, in most cases, the e-learning materials were used to explain topics in another way that hopefully most students will understand. He argued that some students like to listen to lectures, some students like to read from the handouts, but there are students who prefer to use electronic resources and prefer to have interactions with the electronic resources. Since audio can be used, students can receive information in a similar way to that provided by teachers in the traditional teaching environment. The use of e-learning materials in this college was also to enable tutors to personalise the students learning preferences, which is quite similar to the reason given by the ILT Coordinator from College F:

> They are used to include all students and the learners who are either excluded by the conventional methods or those who are not particularly switched-on by the conventional methods.

Another strong supporter of the Government initiatives on the use of e-learning materials was the ILT Champion from College G, who strongly believed that the e-learning materials could support and enhance learning as reflected by the following interview extract:

> It's a Government requirement and I am totally committed and interested in it. I would use the tools even if they were not a Government requirement because I strongly believe that they can support and enhance learning.

The ICT Services Manager from College I also viewed positively the use of e-learning materials in his college for their multi functional capability:

> Basically, the e-learning materials are used to reinforce learning; to provide an opportunity for the students to learn after class; to provide the teachers with aides to continue stimulating the students and also for a whole range of things.

The main issues here are that teachers use e-learning materials because:

1. they support and enhance traditional methods
2. they enable personalisation of learning
3. the Fe colleges are obliged to by Government requirement
4. they enable variation in teaching methods
5. they facilitate inclusivity
6. they enable information to be put in different ways
7. they motivate and interest students
8. they are interactive

Several of the issues identified above relate to personalisation and inclusivity, particularly the Learners' Charter proposed by Green *et al.* (2005). The diagram below maps the issues above against the four aspects of the Charter.

Table 5.6 Map of issues against the Learners' Charter for Personalisation

Personalisation aspects	Issue from Section 5.4.3.
Choices	6, 8
Skills and knowledge	5, 8
Appropriate learners' environment	1, 4, 5, 6, 8
Feedbacks	1, 4, 5, 7, 8

The map shown in Table 5.6 seems to present an interesting paradox. Traditionally, ICT is regarded as a means for knowledge and information management. Yet Table 5.6 seems to indicate that this is not the main value of the technology as *skills and knowledge* only relates to two of the themes identified from the interviews. The most common themes from the personalisation agenda seem to be *learners' environment* and *feedbacks*.

Often the learning environments are considered to be the physical environment of the classrooms. However it is important to note that technology can contribute to and even form part of the environments. Green *et al.* (2005) express this very succinctly:

> At the heart of personalisation is the understanding that learning environments comprise the totality of factors with which the learners interact, including people, spaces and resources. It is an ecology of learning in which both the learner and their environment respond flexibly to constant change in interaction with each other.
>
> Green *et al.* (2005: p 19)

So it appears that ILT managers are identifying ICT as a new aspect of the learning environments. Green *et al.* (2005) emphasise the importance of people, for example in

face-to-face teaching, but it's important to note that ICT can form an important role in enabling communication between these individuals.

In terms of feedback, Green *et al.* (2005) note that effective assessment should engage, motivate and interest the learner. These are also issues raised by the interviewees. Furthermore peers' feedback is very important for assessment and learning, and ICT can be an effective tool for communication between peers.

5.4.4 Is there any Evidence that the E-learning Materials Enhance Learning?

This section seeks to identify evidence to support claims that the e-learning materials enhance learning. Results from the survey interviews have suggested that there was certainly evidence to show that the e-learning materials enhance learning since all the respondents gave an indication to that effect. Please refer to Table 5.7, which indicates all the evidence furnished by the FE colleges, of which some colleges gave more than one piece of evidence to support their claims. It was noted that most of the evidence was obtained from the respondents' personal teaching experience, either through classroom observations and/or daily interactions with the students or from the following sources: outcomes from the colleges' perceptions survey; exam results and assessments; the students' level of engagement; outcomes from the colleges' student questionnaires; research into the direct link between using effective e-learning materials and achievements; outcomes from the colleges' internal inspection; comments from the students' forum in subject areas; and from other anecdotal evidences.

Table 5.7 Is there any evidence that the e-learning materials enhance learning?

College A	Yes.
College B	Yes, definitely. The outcomes from the perceptions survey have suggested that the students used e-learning materials regularly so much so that they reached an expectation of having them within their courses as online support which they could go to.
College C	Yes. From the results that they obtained, it shows that generally those courses, which employ e-learning materials tend to get a more enthusiastic, more committed students and they tend to get high success rates. And also from the engagement of the students, it tends to be evidence that the e-learning materials enhance learning.
College D	Yes. From the students' questionnaires, there is no doubt that the students do like engaging with the e-learning materials, if they are good materials. And from some research into the direct link between using effective e-learning materials and achievement, access to more interactive engaging materials should interest the students and hence motivate them more. In this way it gives some benefits to the students, provided it's done correctly and effectively.
College E	Yes; it enhances learning. The e-learning materials help to motivate the students because it is exciting for them to do something different and to use computers. The students were asked about the effectiveness of e-learning materials during the internal inspections, and they said it makes a difference.
College F	Yes, from the outcomes of the students' forum in subject areas. A common comment from the students' forum is that the students always want the tutors to use more of the VLE, the whiteboard and the computers. During the interviews, the students appreciated the experiences they are having. So the demand is coming from the students for more use of e-learning materials.
College G	Yes. There is certainly evidence that concepts are grasped quite well by students who need visual stimuli. There is also evidence to show that with substantial PowerPoint presentations and student interactivity, the use of e-learning materials does enhance the learning opportunity and experiences.

College H	Yes, there is evidence. The tutors felt certain that students do better when they use e-learning materials than they have done in the past.
College I	Yes, certainly it does. If a student can't have access to learning that happens in class again, when he goes back home, the same quality of materials available at home helps him achieved. For the students who have perhaps some problems and they need more reinforcement, by having the stuff electronically available and without emotions involved, it does improve learning.

Note: The above data were extracted from the results of the semi-structured interview survey

The most significant issues here are;

- Lack of emotion in e-learning
- Value to those with visual learning styles

Learning styles will be discussed later in this chapter (Section 5.4.6). The comment on emotions is interesting. A criticism of ICT is often that it does not provide the non-verbal cues that are so important in face-to-face communication, yet this interviewee (College I) is indicating that this is a benefit. Emotions are considered important to the personalisation of learning as it contributes to effective feedback. Similarly, emotions form part of the affective domain (Bloom *et al.* 1964). If the use of ICT is lacking of emotions, then it will not be very effective for teaching values, attitudes and beliefs. The relevance of emotions was addressed in Section 5.2 in relation to Race (1998). This point is worth repeating:

> The e-learning environment can be beneficial here as the relationship is between computer and learner and the consequences of mistakes are very limited.
>
> Section 5.2 p.136.

There is a link to motivation here in that adverse feedback in public does not motivate learners and consequently affects learning.

5.4.5 What would be the Effect of not Using the E-learning Materials?

One of the areas to be examined in Chapter 5 is to consider the likely effects of not using the e-learning materials. Based on the results from the interviews, it was suggested that there would be certainly an effect on FE colleges for not using the e-learning materials. With the exception of College B, all the FE colleges studied offered their views on the effects of not using the e-learning materials in teaching and learning. According to the respondent from College A, the effect of not using the e-learning materials would mean that there would be a less broad range of resources available to match the learning styles of the students and probably some students would have more difficulties in learning. The respondent from College D on the other hand considered that they would not be offering good service to their students, and ultimately they would lose student numbers, as the students would go elsewhere. The respondent from College F in turn, predicted that they (as a college) would have a much more gray (dull) learning environment if they did not use the e-learning materials. He further argued that the approach (not using e-learning materials) would not actually match the students' common experience as they are exposed to multimedia in their general environments. This view is supported by the respondent from College E who suggested that the students' expectation is not met if they do not use the e-learning materials. According to her, the expectation of the students is that there will be computers (e-learning materials) in every subject. So it would be surprising for the students if the college does not use the technology because they use it in their own life and they come to an environment which

is all paper-based and desk-bound, quite far from their experience outside college. The ILT Manager from College H seems to agree with the prediction that the expectations of the students are not met if they (as a college) are not using the e-learning materials. According to him, the students' need would be affected, because they are used to this type of materials in schools, so they expect it when they come to the college. He further added that for students who particularly learn that way, they would really lose out.

It was noted from the survey interviews that the other effects of not using the e-learning materials would be the following: some tutors will have a lot of time for themselves since it is very time consuming to produce e-learning materials (College E); and also there could be a serious repercussions for the college, not to be involved in the changing aspects of the world (College C). Respondents from College G and I were somehow looking at different angles when they were asked to predict the effects of not using the e-learning materials. According to the ILT Champion from College G, the effect would be greater among the younger students, as most of them are computer literate. As for the older students, there wouldn't be too much effect simply because they see ICT as a network to support their learning, and also because they like the personal contacts (traditional teaching) more. The ICT Services Manager from College I on the other hand perceived that they (as a college) are going back in time if they are not using the e-learning materials. Looking back at the college's long-term achievement rate, they found that students achieved more and attained more and that was to a large extent subject to the additional technology that they (the tutors) used to teach the students.

The main point here is that learners expect ICT to be available and used in teaching and learning. This is partly because they are used to it being a part of their learning

experience and partly because it has become part of their lives, to the extent that it is even one of their emotional needs and thus could be considered important for meeting higher order needs (Maslow, 1970) and therefore essential for effective learning.

5.4.6 The Relationship between E-learning Materials and the Learners' Learning Styles

The results from this investigation have suggested that the relationship between e-learning materials and the learning styles of individual learners do exist. It was noted from the surveys' interviews that one of the advantages of using e-learning materials is that it helps learners with different learning styles as indicated by the Vice Principal for Curriculum and Quality from College A:

> The great thing about e-learning materials is that they help learners with different learning styles. Many of the students have a very mature approach to selecting information from the World Wide Web (Internet) and are very good at using VLEs to find information and to use them for online learning. For those people with that kind of learning styles, it is very good for them. So I think if we didn't have e-learning materials, it would mean that there is a less broad range of resources available to match the learning styles of the students and probably some students would have more difficulties in learning.

The other advantage of using e-learning materials is that it enables tutors to personalise the student's learning preferences as demonstrated by the following interview extract:

> It's also about personalising their (the students) learning preferences. So if you are making a lot of materials available online for Web CT, (VLE) then you can actually personalise each person's pace. If they do very, very well you can give them extra materials to stretch their ability. If they are struggling and they don't understand the topic, you can give them support and have a very flexible IT system. It allows you to do that which previously you wouldn't be able to do. So that is the true big benefit.
>
> (ILT Development Manager from College D)

Evidence from the survey interviews has also suggested that tutors who used e-learning materials in their teaching and learning are able to accommodate the learning styles of their students:

> Mostly we do work in cohorts, so we could actually in terms of quality, ensure the same learning materials are available to the whole class. However in terms of differentiation, not everybody's learning styles are suitable to this delivery. So we have to mix and match the delivery.
>
> (E Learning Manager from College C)

> And I think the reason for that is because they (e-learning materials) actually accommodate the learning styles of students. Some students are passive or lethargic or whatever. This new approach (using e-learning materials in teaching and learning) is actually doing that (accommodates the student's learning styles).
>
> (ILT Coordinator from College F)

The most significant issues from this section are;

- E-learning materials help learners with different learning styles as they allow tutors to accommodate the learning styles of their students.
- E-learning materials enable tutors to personalise the students' learning preferences.

5.5 Conclusions

This chapter has presented the findings on the ways in which e-learning materials are used and the implications for the pedagogy of e-learning materials in post-compulsory education. Section 5.2 described in detail the ways in which e-learning materials are used in teaching and learning while Section 5.3 identified the ways in which e-learning materials are being applied in teaching and learning situations. Section 5.4 presented

findings on the implications for the pedagogy of e-learning materials. Tables, figures and the relevant interview extracts were included to substantiate and support the findings presented in this chapter.

The most significant issues to emerge from this chapter are:

- There was some evidence that teachers prefer to use e-learning materials in a student-centered fashion.

- Teachers felt that a benefit of e-learning materials was that they facilitate immediate engagement with learning.
- A particularly interesting quote suggested that students put more credibility on information provided electronically.
- One teacher emphasised that e-learning materials provides a new dimension to the learning process.
- The e-learning materials are used by teachers mainly because:
  - The materials support and enhance traditional methods
  - The materials enable personalisation
  - The teachers are obliged to use e-learning materials (government requirement)
  - By using the materials it enables variation in teaching methods
  - The materials facilitate inclusivity
  - By using the materials it enables information to be put in different ways
  - The materials motivate and interest students
  - The materials are interactive

- The decision to use e-learning materials for any syllabus depends on the tutors; whether this is appropriate or not. In most cases FE colleges always encourage tutors to use e-learning materials in their curriculum areas.
- There was controversy about whether e-learning materials are most suitable with certain subjects, rather than others, since 67% of the FE colleges studied suggested that there is no particular aspect of the syllabus for which e-learning materials are particularly suitable.
- Some teachers indicated that they use ICT for part, rather than the whole session.
- The indication by some teachers that the use of e-learning materials is not available on-demand by students.