ACCESS TO ELECTRONIC INFORMATION RESOURCES: THEIR ROLE IN THE PROVISION OF LEARNING OPPORTUNITIES FOR YOUNG PEOPLE. A CONSTRUCTIVIST INQUIRY.

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Abstract

This PhD study was designed to answer the question; does access to electronic information resources have a role to play in breaking down barriers to learning encountered by young people? If so, how does it, why does it and what are the circumstances which influence this role? The answers would then provide a deeper understanding of the use of these resources. This is a constructivist inquiry; sixteen young people aged 13-14 years were selected using snowball sampling to provide maximum variation. Emergent design was a feature of the research model and due to the uniqueness of this approach in Library and Information Science, in depth discussion of the research model is included in this thesis. Prolonged engagement with the sixteen participants using data collection methods such as in-depth interviews, observations, logs, and document analysis created 'rich pictures' of the individuals in the form of holistic case studies. These case studies were used as the basis of a cross-case analysis in order to provide for transferability of case, based on contextual applicability and to generate a theory grounded in the data from cross-case themes as they emerge. This study has produced a model of learning opportunities based on tangible and perceived affordances. This model was then used to structure the variables identified as significant to the role of electronic information resources in the provision of learning opportunities. A framework of potential learning opportunities in the electronic information environment has resulted which identifies the tangible variables such as availablity and accessibility of technogies and perceieved variables such as motivation, interaction. These vairables impact on affordances of electronic information resources on learning opportunites.

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Abbreviations

EIR Electronic Information Resources

ICT Information and Communication Technology

LEA Local Education Authority

OPAC Online Public Access Catalogue

Keywords

Learning opportunities

Electronic information resources

Children

Young People

Education

Grounded theory

Constructivist research

Constructivist learning

Learning environments

1 Introduction

This research has been designed to answer the question; does access to electronic information resources [EIRs] have a role to play in the provision of learning opportunities for young people? If it does, then how does it, why does it, and under what circumstances? Thus providing a deeper understanding of the use of these resources. This research focuses on developing an understanding of the individual user within their natural context. This, in turn, will suggest some guidelines for good practice in the management and provision of these information resources at a local level and inform practice at a global level. The fundamental issue of this research is the role of information in the provision of learning opportunities to the young people at the heart of the study.

> ' Children in schools frequently engage in information-seeking tasks either for personal interest or as part of some instructional activity. It is a process that usually involves such activities as locating, selecting, organizing, interpreting, synthesizing, and communicating relevant information. In most instances, an assumed and implicit purpose of the information seeking is that some form of learning will occur. But it is not necessarily the case.' [Oliver & Oliver, 1997, p.519]

'Learning with hypermedia is essentially an information usage activity,' [Yang, 1997. p.71] which places this research firmly within the field of Library and Information Science [LIS]. The focus of this study will be the individual youth and his/her entire electronic information environment, both school-related and personal [Latrobe & Havener, 1997]. Expectations of new information and communication technology [ICT], in relation to learning are great, and these expectations ‘are often used as the argument for the introduction of computers and ICT in schools and other educational settings’ [Hernwall, 1999 p.1]. However, initial inquiries carried out in the early stages of the research confirmed that there was disparity of access to EIRs through ICT between separate schools, public libraries and homes. There was also a lack of consistency of access within individual organisations [BECTa, 1998; Cole, 1996; DfEE, 1997a, 1997b, 1999; NiAA, 1997].

The National Curriculum has made it possible for the school library to become the central agent in the delivery of the information skills curriculum. The management of many schools and their use of resources and space is grounded upon the pre-technology curriculum [Richardson, 1993]. The durability of the school system indicates that it is unlikely to change radically due to new technologies [Brown, 1994 & Papert 1996] and yet 'technology is reducing the barriers of space, time, caste and language' [Chen and Kashper, 1992]. It is

therefore possible that it could also reduce the barriers imposed by ability, disability, age, sex and motivation to learn. This may mean that opportunities are being missed by both learner and teacher and that some deep seated assumptions about access to EIRs in schools need to be challenged.

Recent reports on the standard of access to, and skills to use, class and school libraries have shown that there is inequality in access and therefore inequality of learning opportunities. There is evidence to suggest that 'the cognitive effects of the more recently developed environments are speculative. Research is needed to extend this understanding' [Kozma, 1991, p.210]. Ten years on this still appears to be the case [Klienman, 2000]. Much of the recent rhetoric concerning the benefits of access to EIRs is based on speculation and more empirical research is needed [Williams, 1999].

1.1 Methodology

The form of the research question is exploratory and descriptive. The use of electronic information by the young people involved takes place in their own, multi-layered environment. Their activities are interwoven into this framework and therefore their behaviour is significantly influenced by it. Therefore the research adapted the approach of Lincoln and Guba [1985], Stake [1995] and Yin [1994] to produce in-depth, holistic case studies. This approach would provide readers with sufficient contextual and environmental descriptions to allow them to transfer the case based on conceptual applicability. A second goal was 'to generate theory which is fully grounded in the data' [Dey, 1993, p.103]. Glaser and Strauss [1967] define a grounded theory as being one which is 'readily applicable to and indicated by the data' and is 'meaningfully relevant to and be able to explain the behavior under study'[p.3].

This research presents rich, descriptive narratives at a micro level to provide detailed descriptions which will allow readers to make sufficient contextual judgements to transfer outcomes, themes and understanding emerging from the case studies to alternative settings. Cross-case themes will then provide theory grounded in the raw data of the individual case studies [Strauss & Corbin, 1990]. The concern here is with the multiple constructions of reality as experienced by the individual. Concentrating on individual access at a local level should help information specialists to address the pressures of how best to allocate resources

and organise the provision of a service which needs to be effective, efficient and economic [Underwood & Underwood, 1990]. This constructivist methodology has two aspects; hermeneutics and dialectics [Guba, 1992]. Here the single, sealed unit, the holistic case, will deal with the hermeneutic aspect. The dialectic aspect will be dealt with by workshops where participants are encouraged to compare and contrast the individual constructions of reality by debate, thus giving them the opportunity to confirm the credibility of their own stories and examine the cross-case themes as interpreted by the researcher. Each 'case is instrumental to learning about' the impact of access to EIRs on learning 'but there will be important co-ordination between the individual studies' [Stake, 1995. p.3]. This research focuses on 16 in-depth case studies of individual learners between the ages of 13 to 16 years over an observation period of 18 months. The purpose of this research is to generate a grounded theory, not to test a theory that has been determined 'a priori'. However, there is a need to underpin the research with a sound conceptual framework developed from theory grounded in earlier investigations [Lincoln & Guba, 1985]. This can then be used to develop a strong theoretical base; a collection of signposts that will alert the researcher to established concepts without excluding the emergence and development of unforeseen issues. Following the advice of Wilson [1994] and Westbrook [1993], the theoretical base for this research was drawn from multi-disciplinary exploration. The conceptual framework of the study was developed by integrating research from, educational psychology, information science, human computer interaction and learning theory. This type of in-depth, longitudinal study, taking a constructivist approach to the research, although becoming more common, is still unusual in LIS. Therefore an in-depth discussion of constructivist inquiry will be presented in Chapter 2.

1.2 Information behaviour

In order to examine the role of information in the provision of learning opportunities it is necessary to develop a conceptual framework. This will provide signposts for the collection of primary data for this study. Models of information seeking behaviour will be discussed further in Chapter 3. This discussion is based on work by Kuhlthau [1989 & 1991] and Pitt [1995] to provide insight into the information behaviour of young people. Ellis has carried out extensive research, taking a grounded theory approach, into the information behaviour of academic researchers in a number of disciplines [Ellis, 1993; Ellis & Haughton, 1997]. Although the subjects of these studies may be expected to exhibit more complex information

seeking behaviour, the methodological approach has informed this research. The 'PLUS' model described by Herring [1996] is used as a framework for examining the presence of information skills amongst the young people in this study. Other researchers to be discussed in more detail have studied the information-seeking behaviour of students within specific electronic environments excluding, by design, all other information resources. [Borgman, 1995; Large, 1995; Marchionini, 1995; Neuman, 1995. & Yuan, 1997]. Other studies have concentrated on various aspects of the individual student's social and personal environments. Burdick [1995], Ford & Miller [1996], Jacobson [1994] and Poston-Anderson & Edwards [1993] all considered the impact of gender issues on information use. Influences of social class and race on information use have been examined by Martinez [1994] and Sutton [1991]. As Yuan points out; 'most end-user studies aimed at searching behaviour have focused on descriptions of behaviour or performance on a particular set of tasks' [p. 219]. There are few which focus on natural behaviour in the entire information environment of the individual [Williams, 1999]. Opinion of the effect of the tool used to provide and access information on learning is divided. There are those who believe that 'media are mere vehicles that deliver instruction but do not influence student achievement any more than a truck that delivers our groceries causes changes in our nutrition' [Clarke, 1989, p445]. Research has indicated that learning and cognitive development are intricately linked to opportunities to process and interact with relevant information and the medium used to deliver this information may well have an impact on these opportunities. [Borgman, et. al. 1995; Hiltz, 1993; Kozma, 1991, &Yang, 1997].

1.3 Learning opportunities.

Access to learning opportunities and the motivation to utilise that access is vital if the full potential of the individual is to be reached. The delivery of library and information services in schools, of which electronic resources is a part, has become entrenched in fundamental beliefs established long before the introduction of multimedia to schools [Papert, 1996]. Ranson [1992] states that there is 'a need to break away from such rigid delivery systems' [p.74] but before radical changes can be implemented it is vital to study the alternatives and ensure that they do indeed offer a better future.

An effective and efficient system of provision, organisation, management and utilisation of all the learning resources in a school, including electronic information and awareness of

other collections of resources outside of the school is essential. All schools need to be aware of their requirements for such a system and how that system will operate for the good of the school as a whole and all individuals within that school. It is vital to determine the role electronic information can play in the provision of, and access to, a learning resource and the value it has to the individual. Learning opportunities, learning theory and individual approaches to learning will be discussed in Chapter 4.

1.4 Aims and objectives

This research will present 16 individual case studies and draw out cross-case themes to establish current practice and determine ways forward in managing electronic resources in schools. Towards this end a framework of 3 aims and 7 specific objectives was established to guide and focus the inquiry.

Aims

- To answer the question; does access to electronic information resources have a role in breaking down barriers to learning opportunities encountered by young people?
- If so, how does it, why does it and what are the circumstances which influence this role? To provide a clearer understanding of the use of these resources.
- To suggest a guide to good practice in managing EIRs and develop a criterion based framework of potential learning opportunities in the electronic information environment.

A set of 7 specific objectives has been established arising from these aims to;

1. identify and evaluate current use of electronic information by young people.
2. establish the current context set by Central Government, LEA, and individual school policies.
3. establish what young people assume they are doing in relation to the process witnessed by the researcher.
4. consider motivation to use electronic information and the effect this has on the participants' learning.
5. establish the level and quality of information skills training available to young people, and examine its application during the information seeking process.
6. examine the conditions that influence use of these resources.
7. establish the conditions under which access to electronic information does impact positively on learning opportunities.

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2 Methodology

2.1 Introduction.

The purpose of this research is to generate theory that attempts to explore the role of EIRs in the provision of learning opportunities for young people. This theory will then be used to suggest ways forward in the use and management of EIRs in order to enhance their role in the provision of learning opportunities. 'Purpose is the controlling force in research. Decisions about design, measurement, analysis, and reporting all flow from purpose' [Patton, 1990 p.150]. When looking at hypermedia, Yang [1997] suggests that 'using constructive, phenomenological, and naturalistic alternatives to the traditional empirical paradigm could provide richer, context-specific information necessary to understand the effectiveness of this interactive media'[p72]. These alternatives fall under the *interpretivist paradigm* [Williams, 1999]. One approach within this paradigm is that of constructivist inquiry. This study adopted a constructivist approach in order to provide rich, context-specific information at a local level, from the perspective of the young people themselves which can be transferred to other local situations as well as contributing to the global picture.

2.2 Constructivist Inquiry.

In 1979 Schwartz and Ogilvy published their analysis of concepts emerging in many disciplines. This analysis demonstrated a shift from the positivist paradigm to a new, diametrically opposed paradigm [Lincoln & Guba, 1985]. Although defining the term 'paradigm' is a complex issue, Schwartz and Ogilvy applied one of the definitions of a paradigm originally provided by Kuhn [1970] as a means of viewing the world, influencing but not controlling the assumptions and direction of research. Assuming that 'paradigms [are] the entire constellation of beliefs, values, techniques, and so on shared by members of a given [scientific] community' [Kuhn, 1970, p.146] and that they 'provide the concrete puzzle solution or exemplar of how to solve a scientific problem' [Seale, 1998, p.12].

The basic axioms of the interpretivist paradigm have emerged from this new world view, five of those are specific to constructivist inquiry. These are; realities are multiple, constructed and holistic, the researcher and the researched interact to influence each other;

all descriptions are time and context bound; it is impossible to separate cause from effect as all entities are in a state of simultaneous shaping [Lincoln and Guba, 1985]. The constructivist approach emphasised the shift from a simple, single reality, to the complex, multiple realities of the individual. This shift highlighted the need to move away from studies which aimed to abstract one element, or just a few elements, of the subject under study, whilst holding every other element constant. Any act of experimentation or observation will inevitably alter the state of the subject being studied. Any research activity will leave the subject of that research in an altered state. Heisenberg [1958] claims that ‘what we observe is not nature itself, but nature exposed to our method of questioning’ [p. 288]. The data, which is gathered from that research, might itself be, in part, a product of the research process. The time and context in which the data was gathered will also influence it. 'Context is something you swim in like a fish. You are in it. It is you' [Dervin, 1997 p32]. In order to make sense of individual behaviour, this behaviour needs to be studied in a natural setting. It is misleading to assume 'that from what we can learn about people in a very limited, unusual, and often very anxious situation we can make reliable judgements about what they do in very different and more usual situations' [Holt, 1983 p.8].

A major advantage of constructivist inquiry is that it can offer understanding of the meanings behind the actions of individuals. 'From this perspective, meaning depends upon context, and the interpretation of action or opinion must take account of the setting in which it is produced' [Dey, 1993 p.110]. Constructivist inquiry seeks to understand the entire context, both at the macro- and micro-environmental level [Dixon & Banwell, 1998]. Only by providing the reader with this rich picture can the researcher claim sufficient detail for transfer of findings. The commitment in this research was to revelatory interpretation, which would not undervalue what the individuals in the study experienced and reported [Nardi, 1995*b*]. The use of EIRs by the young people in this study took place in their own, multi-layered environment. Their activities were interwoven into this framework and therefore their behaviour significantly influenced by it [Layder, 1993]. The methodology demanded that the study be carried out in a natural setting, not only because the context was important to the research, but also because *real* behaviour can only be witnessed within its natural context. This study focused on a natural setting for all data collection.

It is within this interpretivist paradigm that many disciplines have begun to move towards the constructivist approach to research, although the degree to which this move has taken place varies greatly both between and within individual disciplines. As Lincoln and Guba point out, 'accepting the [interpretivist] paradigm involves a good deal more than a simple accommodation in one's previous thinking. It is in fact a *revolutionary* move' [1985 p. 47]. Whether or not individual researchers should concern themselves with paradigm level arguments has long been debated. There are those who argue for paradigm purity in the research process and Lincoln and Guba [1988] put forward strong arguments concerning the application of both qualitative and quantitative methodologies within an overlying paradigm. They argue that mixed methodology is not only inappropriate, but impossible:

> 'Like water and oil, they do not mix; indeed, to put them together is to adulterate each with the other. Like similar magnetic poles, they repel one another; to hold them in contact requires force, and when the force is released, the methodologies fly apart.' [Guba, and Lincoln, 1988 p.111].

Their model of the research process does not make any distinction between research methods [the overall form of the research] and research techniques [the individual data collection techniques]. This distinction is necessary, as an individual method does not necessarily relate to a specific data collection technique. This distinction is not often made in the literature on research methods, '[t]ypically books about research treat techniques and method together, thereby implicitly limiting the use of a particular technique to a certain method,' [Harvey, 2000. p.xv]. Figure 2.1 describes the connections and relationships between various levels of the research hierarchy using work by Lincoln & Guba [1988] and building on that to include all major elements of a research study.

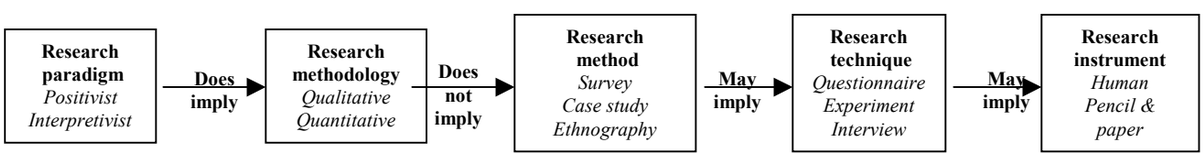

Figure 2-1 The Research Hierarchy

Gorman and Clayton [1997] identify the fundamental argument between the two methodologies. They present a summary of both qualitative and quantitative approaches to an inquiry. Although they do not argue necessarily for paradigmatic purity, it appears implicit in the distinctions between the two. They begin by examining the basic assumptions of each mode of inquiry; quantitative methodology assumes the objective reality of social facts, qualitative methodology assumes social constructions of reality [Gorman and Clayton, 1997 p.24-28]. These *assumptions* are in fact two of the basic axioms of two separate belief

systems, two conflicting paradigms. There is no consensus of opinion concerning the need for paradigmatic purity in research. Many social researchers see methodological eclecticism as the only pragmatic option. Feyerand argues that this eclectic approach to inquiry is not only possible, but necessary if science is to advance, claiming that both 'methodologies have their limitations and the only "rule" that survives is "anything goes"' [Feyerand, 1975 p.296]. There is the claim that striving and debating over paradigm issues does not help in achieving the aims and goals of the research. This is supported by Miles and Huberman, who contend that; 'researchers should pursue their work, be open to an ecumenical blend of epistemologies and procedures, and leave the grand debate to those who care about it.' [Miles and Huberman, 1988 p.223]

Michael Quinn Patton argues that, 'narrow socialization into one paradigm or the other typically involves adoption of a world view that limits the kinds of questions that are asked and the strategies used to answer those questions' [Patton, 1988 p.135]. It may well be the case that '[e]pistemological purity does not get research done' [Miles and Huberman, 1988 p.224], but the implications of a belief system within research has to be identified as a strong factor in the selection and application of an individual methodology. Lincoln and Guba remain firm in the belief that methodologies imply paradigms and only by acknowledging the basic axioms of that paradigm can the research be conducted in a meaningful and productive way. It has been said of them that '[t]heir strong stance on the non-miscibility of methodologies places them at the extreme end of the qualitative spectrum.' [Fetterman, 1988 p.279]. Having extreme polarities is necessary to establish the place of individual studies along the continuum between those poles, being aware of these polarities also allows the individual researcher to make informed choices concerning appropriate methods. 'Being aware of paradigmatic blinders is a first step towards greater situational responsiveness and creativity in making methods decisions' [Patton, 1988 p.118].

This research attempts to adopt a qualitative methodology, within the interpretivist paradigm, applying constructivist inquiry to achieve the goals of the study. Although, at an individual methods level, it is possible to use both qualitative and quantitative tools and techniques;

> 'Moreover, there is nothing in this formulation that militates against the use of quantitative methods; the naturalist is obviously free to use them without prejudice when it is appropriate to do so (for example, using questionnaires to collect a broader array of opinion than can be obtained from a few

interviews, provided the questionnaire items are grounded in local data and not devised a priori). [Guba & Lincoln, 1988, p.105].

2.3 Research model.

The choice of methods within this research had two main goals; firstly, to produce in-depth, holistic case studies [Stake, 1995 & Yin, 1993], giving the reader sufficient contextual and environmental descriptions to allow them to transfer the case based on conceptual applicability. Secondly 'to generate theory which is fully grounded in the data.'[Dey, 1993 p.103]. Constructivist case studies based on qualitative data were used to provide rich pictures of individuals and their interaction with processes, social relationships and organisational frameworks. A constructivist approach, focusing on sixteen, in-depth, holistic case studies [Yin, 1984] was used to produce 'rich pictures', which could then be transferred to other situations based upon contextually applicability. Each case was situated in the 'bounded system' [Smith, 1979] of one of four schools sites used and all were embedded in the macro-environment of national policies. These are holistic cases because the focus was on the individual young people, to call them embedded would have implied that each school was studied in equal detail to each individual participant [Yin, 1989]. This was not the design of the research, the school acted only as the bounded system for the participant. As well as individual rich pictures, cross-case analysis of all sixteen case studies identified issues which were generic across the research study, such as motivation, purpose, stress and application of information.

As the emergent design of a constructivist inquiry does not allow for a detailed plan before the research begins 'the research design must therefore be 'played by ear'; it must unfold, cascade, roll, emerge' [Lincoln and Guba, 1985 p.203]. However, it is possible to develop a model which allows for the iterative nature of the study. A model was developed [*see figure 2.2*] based on past research in the field and adapted from Lincoln and Guba's generic research model [1985, p.188 and 1988, p.104]. This model illustrates the entire research process conducted within the boundaries of *trustworthiness;* transferability, credibility, dependability and confirmability. The focus of the inquiry was the study of young people in their own natural setting investigated by a human instrument [the researcher]. The human instrument applied qualitative methods, complemented by tacit knowledge, to that inquiry. Sequential snowball sampling was employed in order to achieve a sample of maximum

variation [Patton, 1987], ensuring that each new research participant contributed characteristics differing from the preceding participants. This allows for multiple perspectives on the phenomena under study. Inductive data analysis was a vital part of both the selection of subsequent participants and the constant building of grounded theory [Glaser & Strauss, 1967]. The emergent design [Lincoln & Guba, 1985] of individual data collection tools was based on the analysis of preceding data and the identification of concepts and ideas, which needed further and deeper investigation. This process produced individual case studies, which were reported back to research participants and discussed with the researcher. From analysis of these individual case studies, cross-case themes were identified which provided grounded theory to be transferred from the local to the global level [Deem, 1998]. The following model has been adapted from the work of Lincoln and Guba [1985].

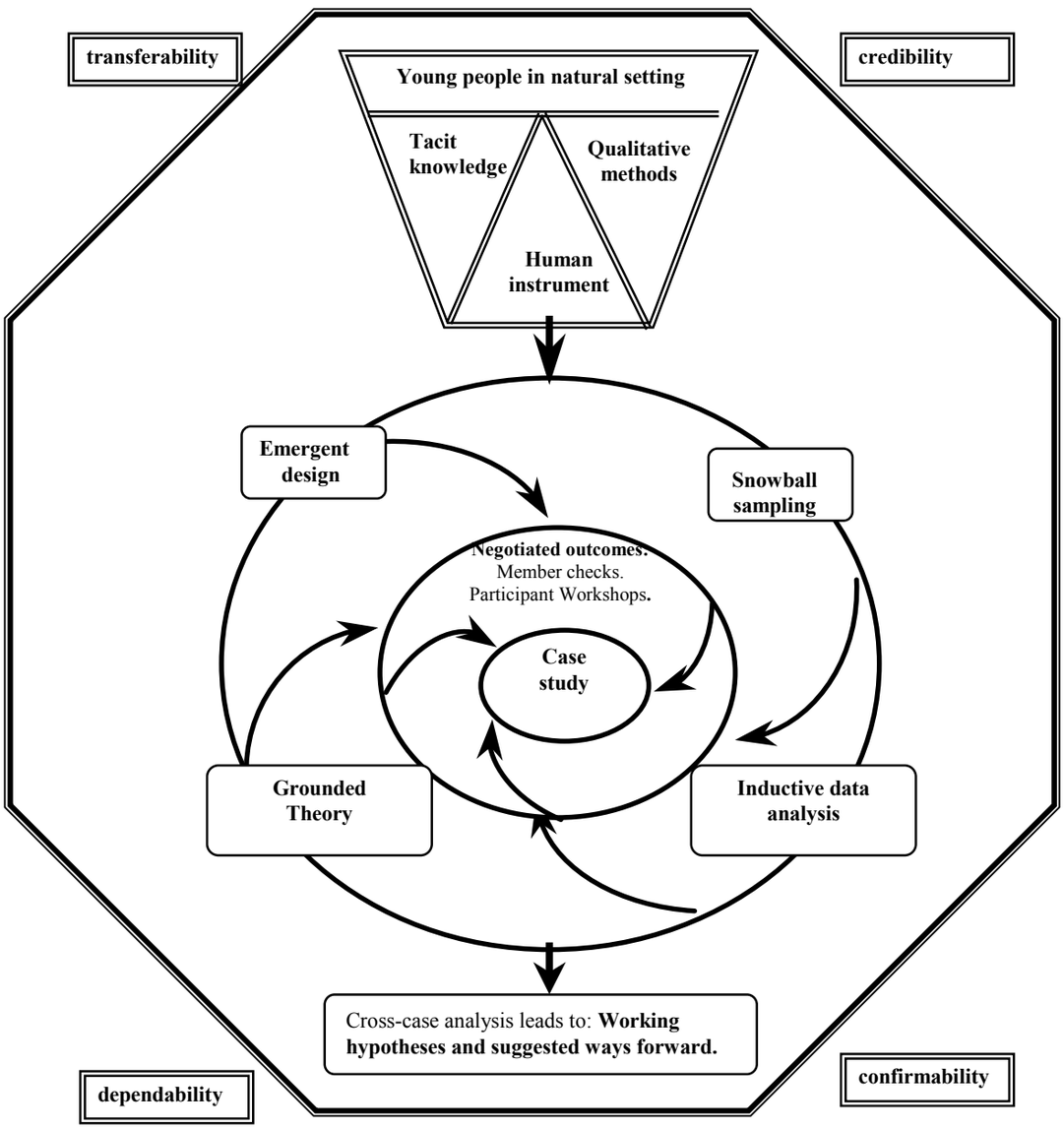

Figure 2-2 Research Model [adapted from Lincoln & Guba, 1985]

2.3.1 Establishing trustworthiness.

Some aspects of the constructivist approach have yet to be applied in LIS research and there is still dependence upon traditional criteria for quality judgements. This research aims to use those aspects of constructivism which have rarely been applied and to demonstrate how criteria of trustworthiness can replace the traditional criteria of rigor which was devised within, and for the positivist paradigm [Lincoln & Guba, 1985]. Wolcott's comments on the application of validity criteria within ethnography demonstrate the inappropriateness of applying criteria established for one research paradigm to another, conflicting paradigm.

> 'a discussion of validity signals a retreat to that preexisting vocabulary originally designed to lend precision to one arena of dialogue and too casually assumed to be adequate for another.' [Wolcott, 1990, p.168-169].

Credibility in this research was shown by: prolonged engagement with the research participants; persistent observation of those participants; triangulation of the methods used to study those participants and their contexts; peer debriefing, and member checks. Member checking was used 'to check with the actors who [were] the subject of [the research] focus how they interpret [the researcher] interpretations. But, at the same time, to not marginalize [the researcher's] voice' [Dervin, 1997, p.31]. Qualitative methodology often applies triangulation as a means of establishing credibility, including for example; triangulation of investigators, theory, method, or sources [Denzin, 1978]. This research used triangulation of sources and method. As each source and type of data had both limitations and strengths, [Patton, 1990] the use of multiple approaches to data collection compensated for any limitations of individual approaches [Marshall and Rossman, 1989]. Interviews could report the individual's perspective on and perceptions of past, present and future events. There is obvious personal bias which could be attributed to many factors. Observations on the other hand, focus on external behaviour and could have been distorted by the presence of the observer. Finally, documentation being used as raw data could be incomplete or inaccurate and may have been prepared very selectively. Lincoln and Guba [1985] recommend that each piece of information within a study should be expanded upon by at least one other source. The effects of the limitations of each approach will be reduced by triangulation. This research relied upon observation, interview, and document analysis to build up holistic case

studies, each giving 'thick description' [Erlandson, Harris, Skipper and Allen, 1993], of individual realities. Whilst data collection provided for description of the phenomenon as seen and felt by the participants experiencing it, there was also the need to remain aware of the aims and orientation of the research. There was also a need for what Mellon refers to as 'objective subjectivity' [Mellon, 1990. p42]. Identifying that it is impossible to remove all subjectivity from a study such as this, allowed the researcher to be constantly alert to this subjectivity and compensate whenever necessary. In the case of this research that was achieved by having each data collection tool audited by the supervising team. The use of a *researcher diary* also meant that interpretations could be examined for subjectivity after the event.

Transferability. In terms of transferability Lincon and Guba note that 'the trouble with generalisations is that they don't apply to particulars' [1985, p.110]. In constructivist inquiry, the goal is to allow for *transferability* of the findings rather than wholesale generalisation of those findings. Here the researcher has the burden of providing 'rich pictures' on an individual level, the burden is then passed on to the reader to gather empirical evidence concerning the cases to which they wish to apply the findings;

> 'Because transferability in a [constructivist] study depends on similarities between sending and receiving contexts, the researcher collects sufficiently detailed descriptions of data in context and reports them with sufficient detail and precision to allow judgements about transferability'[Erlandson, Harris, Skipper and Allen, 1993, p.33].

If sufficient similarities between the two contexts are identified then it is reasonable to apply the research findings to the new context. The positivist response to this is that the researcher is somehow passing responsibility on to the reader when the responsibility for 'discovery' should ultimately be that of the researcher. This argument can only be justified if we begin from the assumption that only a single reality exists and it is the researcher who should discover it. This can never be the case when we are looking at individuals interacting with their own, exclusive environment. 'Further, every context is by definition different, an intersection of a host of nameless factors. Because of this, research can only be particularized and generalization, in the traditional scientific sense, is impossible' [Dervin, 1997, p.14].

Dependability was established by the 'inquiry audit', where an external 'auditor' was asked to examine the inquiry process, the way in which the research was carried out. In order to

allow for this an audit trail was maintained by the researcher along with the research journal. The data produced by the research was examined in terms of accuracy relating to transcripts and levels of saturation in document collection. Lincoln and Guba [1985] recommend the use of 'Halpern Audit Trail'[1] as a means of ensuring that constructions can be seen to have emerged directly from the data, thereby confirming the research findings and grounding them in the evidence. The audit trail for this study can be found in Appendix 3. Dependability is concerned with the manner in which the study was conducted, evidence needs to be provided that demonstrates that the methods and techniques used were applied appropriately and with relevance to the study.

Confirmability is vital in terms of limiting investigator bias. The notion of objectivity is still often used in post-positivist, qualitative research but it is becoming increasingly more difficult to defend even in the modified form in which it is now applied. 'How, when each researcher is embedded in prejudices, values and specific cognitive frameworks, can we move, however tentatively, towards something which might be called *objectivity*?' [Lazar, D. 1998, p.17]. From the constructivist standpoint the answer to this question is that we cannot claim to be wholly objective. The concept that there has to be a way of studying human behaviour that could generate objective results is rejected by constructivist epistemology. The alternative is to ensure that the results, accepted as the subjective knowledge of the researcher, can be traced back to the raw data of the research, that they are not merely as a product of the 'observer's worldview, disciplinary assumptions, theoretical proclivities and research interests' [Charmaz, 1995, p.32]. This research used the audit trail and the presentation of raw data throughout the cross-case analysis to contribute to confirmability. Confirmability is concerned with the interpretation of the research findings by the researcher, there needs to be evidence that the researcher's interpretation was a product of the research. Although this interpretation may not be, and is probably unlikely to be, the same for all auditors, it is necessary to demonstrate that the interpretation did in fact emerge from the data.

2.3.2 Research instrument.

In order to study the young people in their own contexts the human instrument was the most appropriate choice. Pencil and paper or quasi-experimental tests would not have provided

[1] Edward Halpern produced the audit trail as part of his doctoral dissertation; *'Auditing naturalistic inquiries:*

the level of detailed data necessary to produce rich pictures of the individual and his/her environment. Human lives and their interpersonal relationships create complexities that need to be understood and the researcher acting as the research instrument offered the solution to understanding and depicting these complexities.

> 'These complexities ...cannot be figured out, cannot be understood by one-dimensional, reductionist approaches; they demand the human-as-instrument' [Maykut and Morehouse 1994 p.27].

This research combined the individual research participant, the researcher as research instrument and qualitative methods in a collaborative process of producing meaning from data and using that meaning to develop theory.

> 'If a person is to be understood as a person and not as a thing, then the relationship between the researcher and the other person must be a dynamic and mutual relationship'[Maykut and Morehouse 1994 p.37].

It was human experience and situations that were the subject of this research, therefore the human-as-instrument was 'the only instrument which [was] flexible enough to capture the complexity, subtlety, and constantly changing situation which is the human experience' [Maykut and Morehouse, 1994 p.26]. The researcher as instrument is also in a position to apply appropriate tacit knowledge to each situation and event as it occurs. Tacit knowledge can contribute to interpretation of the observed evidence, although confirmation and justification of the application of this knowledge must be possible. In this research tacit knowledge provided a springboard for the generation of theory but was applied tentatively and these theories were only retained and developed when actual evidence to support them was identified.

2.3.3 Grounded theory

To take a *grounded theory approach* to research is to combine purposive sampling, data collection, design of data collection, data analysis and theory generation, in one wholly interactive, iterative and interdependent process. The approach is an assemblage of all of these activities, which then allows a theory to emerge that is grounded in the data. Glaser and Strauss define a grounded theory as being one, which will be 'readily applicable to and indicated by the data', and 'be meaningfully relevant to and be able to explain the behavior under study' [Glaser and Strauss, 1967 p.3]. For the purposes of this research and the subject under study, grounded theory offered an approach that would accommodate both the individual and social nature of the research.

The development and application of a model.' Indiana University, 1983.

> 'Grounded theory methods are suitable for studying individual processes, interpersonal relations and the reciprocal effects between individuals and larger social processes' [Charmaz, 1995 p.28].

The use of prior theories that are themselves grounded firmly in the raw data of previous research has always been seen as an important part of grounded theory. [Charmaz, 1995, Glaser and Strauss,1967 Glaser,1992 Guba and Lincoln, 1988 and Lincoln and Guba, 1985 and Walsh, 1998.] However, it is the case that such prior theory should not in itself influence the data collection and analysis of the new research, although it will act as a set of sign posts for the researcher.

> 'The design of all research requires conceptual bridges from what is already known, cognitive structures to guide data gathering, and outlines for presenting interpretations to others'[Stake, 1995 p.15].

These '*cognitive structures'* were developed from extensive literature reviews into previous studies of *information behaviour*, *information and learning* and *human - computer interaction.* Grounded theory relies on the creation of codes and categories, which have emerged from the data and are not preconceived hypotheses, which are then *tested* in real world situations.

> 'The approach emphasizes the systematic discovery of theory from data, by using methods of constant comparison and theoretical sampling, so that theories remain grounded in observations of the social world, rather than being generated in the abstract' [Seale, 1998 p.327].

This approach demands 'simultaneous involvement in data collection and analysis phases of the research' [Charmaz, 1995 p.28]. Inductive data analysis is an ongoing process from the outset, the method of analysis is essential to the formulation of a theory grounded in the raw data. The 'data collection and analysis go hand in hand to promote the emergence of substantive theory grounded in empirical data' [Marshall and Rossman 1989 p.113]. Taking a grounded theory approach allows for 'the generation of theories and models' which are developed 'inductively from empirical data' [Ellis, 1993, p.473].

2.3.4 Field work.

2.3.4.1 Gaining entry.

This area was of particular concern to this research as the individual participants were young people and there were sensitive issues to be addressed concerning access to, and observation of, their activities within their own electronic information environment. Trade-offs needed to be made relating to location and timing of observations and interviews. In addition to the usual participant consent, there was also the need to secure parental consent and that of the

various environments likely to be of relevance, the most obvious examples being the home and school. Reciprocity had to be acknowledged from the outset. This was dependent upon who was directly affected by the research activity. Participants often get enough out of the process by simply being involved in the research [Patton, 1990], but when a third party was involved,[i.e. a school] some model of reciprocity needed to be negotiated.

Because of the sensitivity of working with young people, the first decision about whether the research was to be covert or overt seemed an obvious one. The ethical choice was to be totally overt during the entire study. Lincoln and Guba [1985] point out that the fully informed consent of the participants is an ethical necessity in any research. In this research it takes on a more prominent role. The example set by Farrell [1988], in his study of high school students in relation to drop out rates, proved to be useful for this study. Farrell was not only totally overt about the research but he also used various techniques to involve the students in the data collection and presentation. In this research participants were involved in the design of one of the data collection techniques, not only as a means of providing a sense of ownership, but also to increase to likelihood of the regular and reliable use of the technique, which, in this case was a participant diary.

Consent forms for both individual participants and their parents were used but these were designed to be as open-ended as possible in order to avoid locking the researcher into a path that could run contrary to the research [Erlandson, Harris, Skipper and Allen, 1993]. It must also be noted that gaining entry does not only include the formal aspects of signing off and gaining permission, it also includes establishing trust and building up a rapport with participants [Patton, 1990]. Prolonged engagement with the participants was one method of establishing trust applied in this research. The researcher spent significant time in the field, and this, on occasion, included accepting invitations to share time with the participants which was not always directly related to the subject of the research. The study had time built in to accommodate this possibility. Trust is also related to the way in which the researcher depicts the individual realities of the participants and how closely this mirrors their own interpretation of their behaviour. The reality of this as it applied to this research, is discussed in detail in Chapter 8: The Reflective Review.

2.3.4.2 Sample

> 'The logic and power of purposeful sampling lies in selecting *information-rich cases* for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term *purposeful* sampling' [Patton, 1990. p169].

Long before entering the field, contact had been made with a number of informants to establish 'ideal sites'[Marshall and Rossman, 1989. p.54.] in which to carry out the research study. Marshall and Rossman [1989], identify four essential components of the ideal site; entry has to be possible, there is a high probability that a rich mixture of processes will be present, it is possible for the researcher to establish a role that will be acceptable, and the quality of the data will be reasonably assured.

The objective in this study was to sample for maximum variation, [Patton, 1990] selecting a relatively small sample of great diversity which would produce detailed, information-rich descriptions of each case, and would highlight any shared themes which emerged. These themes being all the more significant for having come from this small, heterogeneous sample. In order to build a sample of maximum variation, Maykut and Morehouse [1998] recommend the technique of snowball sampling 'to locate subsequent participants or settings very different from the first'[p.57].

Snowball sampling, or 'interactive sampling' as it was originally labelled by Denzin [1970, p.89], can be accomplished in two ways. The first, and the original method of this type of sampling, is to make initial contact with key informants who, in turn point to information-rich cases. The second, and the technique applied in this research, is to begin with an initial participant and through the process of interview and observation, identify characteristics and issues that need further inquiry. These characteristics become the criteria used to identify new cases. There were also issues that were deliberately contrasted in subsequent participant identification in order to provide maximum variation [Ford, 1975; Lincoln, and Guba, 1985; and Patton, 1990]. 'Purposive and directed sampling through human instrumentation increases the range of data exposed and maximises the researcher's ability to identify emerging themes' [Erlandson, Harris, Skipper, and Allen 1993. p.82]. 'The sample was not chosen on the basis of some "a priori" criteria but inductively in line with the developing conceptual requirements of the [study]' [Ellis, 1993, p.473]. The sample in the present case was therefore selected sequentially from one participant to the next based on criteria relating to the electronic information environments of those participants.

This type of sampling demands a viable exit strategy as there are no a priori numerical restrictions placed upon the sample. The purpose of this sample was to maximise information yield. It would then follow that termination of the sample could only occur once no new information was being added to the inquiry via new samples. This redundancy could be the only criteria for termination. Therefore the size of the sample could not be predetermined, 'the criterion invoked to determine when to stop sampling is informational redundancy, not a statistical confidence level'[Lincoln and Guba 1985 p.203.]. However Lincoln and Guba do suggest that 'a dozen or so interviews, if properly selected, will exhaust most available information; to include as many as twenty will surely reach well beyond the point of redundancy'[p.235]. As they relate this only to the interview situation, it could not be as readily applied to long term observation and multiple interviews, which were a part of the in-depth study of each case. The limit on the size of sample used in this research was predicted to be around twelve individual cases. However this grew to sixteen to include both core issues and peripheral issues which were held to be of significance to the study.

The aim was to select a sample that would represent the range of experience relating to the electronic information environment of young people. Identification of the initial participant was 'limited [and presumably, thoroughly biased]' [Ford, 1975, p.302] but the subsequent gathering of new participants reduced this bias. In order to limit this bias still further, the initial sample in this study was the participant used in the ‘dry run’, and although she was used to identify subsequent participants, she was not to be included as a case study in the final analysis. A sample map showing the progression and criteria for sample selection can be found in Appendix 1

2.3.4.3 Phases of the research.

This research adopted the basic structure recommended by Lincoln and Guba [1985]. As each new sample was identified he/she was involved in three distinct phases of the research process: Phase 1; provided an overview and identified the salient issues which needed further investigation. Phase 2; involved focused, in-depth exploration of the issues identified in Phase 1. Phase 3; acted as a 'member check' [Lincoln and Guba, 1985 p.236]; not only did this phase add credibility to the findings it also satisfied some of the ethical issues identified earlier. A ‘member check’ is the process by which each participant was allowed to read his

or her own case study. They were encouraged to discuss the contents of this study in relation to the accuracy of the description and the interpretations of the researcher. These phases were sequential for each sample unit, analysis of the previous phase being essential to the design of the next phase.

Phase 1;-	**Initial contact.**	
	Consent	via sign-off forms.
	Interview	to identify salient issues. [open-ended, exploratory questions looking for an overview]
	Observation	of the participant using electronic information sources [again adding to the overview].
	Time:- 2-3 weeks + Analysis of phase 1	
Phase 2;-	**Focused exploration,**	Interviews [semi-structured, focusing on salient issues without excluding the possibility of new information emerging.] Participant observation Non human sources [researcher's diary, participant logs, policy documents etc.]
	Time:- 6-8 months + Analysis of phase 2	
Phase 3;-	**Prepare preliminary case studies.**	
	Member check.	Case study subject to scrutiny by the participant.
	Time:-2-3 months.	

2.3.5 Data collection

2.3.5.1 Interviews

> 'A major advantage of the interview is that it permits the respondent to move back and forth in time - to reconstruct the past, interpret the present, and predict the future, all without leaving a comfortable armchair' [Lincoln and Guba, 1985, p273].

Initial data collection was through open-ended interviews, the first interview in each case being of an exploratory nature, encouraging the participant to 'engage with the researcher in less structured conversations so that their hidden assumptions and constructions began to surface' [Erlandson, Harris, Skipper and Allen, 1993 p81]. The purpose of these interviews was to access what was in, and on, the interviewee's mind, as the researcher did not want to put ideas there that may not have existed prior to the interview [Stenhouse, 1984]. As this interview was designed to establish salient issues for further study, it was very important to allow the participant the opportunity to tell his or her own story without imposing any preconceptions the researcher may have had. This purposeful conversation [Dexter, 1970, & Lincoln and Guba, 1989], was led by the participant, the researcher did not take more control of the process until analysis and interpretation [Tagg, 1985]. The purpose of using an

interview guide was to 'ensure that each interview [covered] basically the same ground but [gave] the interviewer considerable discretion in the conduct of the interview' [Ellis, 1993, p.475]. This interview was carried out with the participant being fully aware of the nature and purpose of the interview. The interview guide for all 16 initial interviews can be found in Appendix 2.

The second set of interviews, which followed this stage, were designed to be semi-structured and took place after observations had begun. Analysis of the initial interview and observation was then fed into subsequent interview guides developed for each individual participant, and followed up in-depth, any salient issues, which were brought to light by the initial stage. Each interview guide on the second round was designed specifically for each individual interviewee based on previous information from that individual, and from the initial generic interview.

2.3.5.2 Observations.

> 'A major advantage of direct observation, on the other hand, is that it provides here-and-now experience in depth.' [Lincoln and Guba, 1985. p273]

In this part of the study the observer was watching young people using electronic information sources in their own environment. Since one of the primary locations for observation was in school, young people could have viewed the researcher as another teacher or authority figure [Fleisher, 1989]. It was predicted that the young people would view the observer as some kind of 'expert' and be inclined to ask advice and that this was unavoidable. Accepting the impossibility of assuming and maintaining a role of complete outsider, then the researcher must be placed somewhere along the continuum from total outsider to full participant. A balance was needed between participant and observer in order to understand the situation as an insider and be able to describe it as an outsider [Maykut & Morehouse, 1994].

> ' The more you function as a member of the everyday world of the researched, the more you risk losing the eye of the uninvolved outsider: yet, the more you participate, the greater your opportunity to learn' [Glesne & Peshkin, 1992 p.40].

The researcher tried to establish the role of semi-participant, interested expert [Patton, 1990]. This would have been almost impossible without prolonged engagement as it was necessary to establish trust before participants came to accept the researcher.

The observations began in Phase 1 of each case, this first observation was unstructured and allowed the researcher and participant to explore the situation and try to establish some degree of mutual trust. During Phase 2 there were multiple observations over a period of 6 to 8 months, these were semi-structured, the form of which was led by the analysis of Phase 1. Each observation lasted between 30 minutes to one hour. In order to organise the complex realities that were witnessed during fieldwork the semi-structured observations were oriented by the use of sensitising concepts [Denzin, 1978]. These were developed from the review of previous research, where there was evidence to suggest possible signposts for the observations but these were not allowed to restrict the potential of 'new' concepts emerging. As the fieldwork progressed sensitising concepts were taken from previous interviews, observations, and document analysis. These concepts will be discussed in the following chapters. These assisted in 'the systematic description of events, behaviours, and artefacts in the setting chosen for the study' [Marshall & Rossman, 1989. p79], although in this case there were multiple settings.

The presence of any observer in a situation is highly likely to affect that situation to some degree, but the same can be said of any data collection method. The aim here was to limit this effect and keep the situation as close to normal as possible. Observer effect diminished over time and there was a comfortable and trusting relationship between the observer and the observed as this research progressed, prolonged engagement in the field was the major contributory factor here.

2.3.5.3 Documents.

> 'Documents include practically anything in existence prior to and during the investigation, including historical and journalistic accounts, works of art, photographs, memos, accreditation records, television transcripts, newspapers, brochures, meeting agendas and notes, audio- or videotapes, budget or accounting statements, notes from students or teachers, speeches, and other case studies.' [Erlandson, Harris, Skipper and Allen, 1993, p99].

Documents that were of significance to this study were; school policy documents, local and national government policy documents. In addition to these participants' notebooks, project files and homework were regularly viewed by the researcher. Access to these documents was negotiated at the entry stage of the study and sometimes at later stages as and when they became known to the researcher. Personal documents such as diaries or logbooks were kept

by the participants during the study specifically for analysis purposes, these were initially very formal but the design was adapted to facilitate the needs of the individual participants. The researcher's diary also acted as a valuable source of information.

2.3.5.4 Modes of recording data.

Diary

The first method of recording data was continuous throughout the research process; taking the advice of Maykut and Morehouse [1994] a researcher's diary was maintained from a very early stage. The diary was maintained in two forms; the first was concerned with logistics and provided a step by step account of the path taken by this study. The second was a reflexive journal which contained notes on recurring ideas, questions, concerns, discussions, and points when major decisions have been reached about the direction of the research. In constructivist inquiry, the use of a researcher's log is more than a private record, it is essential to the research process; 'For many researchers, the most important thing is to have a personal diary or log in which everything is kept.' [Stake, 1995, p.55]. Strauss goes even further in advocating the use of the log; 'For the purposes of reporting, then, if an episode or remark is not in the log, it did not happen' [Strauss, 1987, p. 79]. In this study the log was used as complementary to the other recorded sources, if events were recorded in interview transcripts, observation notes, or participant diaries, they were not necessarily repeated in the researcher's log.

Audio tapes of interviews.

Lincoln and Guba [1985] recommend the use of field notes during interviews, although they acknowledge that they do not offer the high fidelity of audiotape. They give the following reasons for advocating notes;

- Not as threatening to the participant.
- Process of note taking keeps the researcher alert and responsive.
- Not subject to the technical difficulties of recording.
- Notes provide ready access to earlier points in the interview that may be referred back to for clarification.
- The researcher can add their own notes and comments on the participants' behaviour.
- Taking notes satisfies the participant that they are saying something worth noting.

They state that 'the advantages of field notes over recording seems to us so great that we do not recommend recording except for unusual reasons, as, for example, legal protection or the

collection of materials for later use in in-service training exercises or for referential adequacy purposes' [p241]. Patton [1990], expresses a totally opposing view on tape recording interviews; '[a] tape recorder is part of the indispensable equipment of researchers using qualitative methods.' [p348]. His defence of tape recording rests on the following;

- Tape recorders do not drift away from the conversation.
- They do not change what has been said by interpretation.
- They do increase the accuracy of the data collection.
- Allow the interviewer to be more attentive to the interviewee.
- Taking verbatim notes can seriously affect the interactive nature of an in-depth interview.

As both of these arguments appeared to be valid, combining the two could either mitigate against, or compound, the disadvantages of both. The interviews were recorded and field notes were made during the interview, which indicated participant behaviour, and any recurring themes. The security offered by the audio tape allowed the researcher to become involved in the interview without fear of missing any significant statements. Taking notes allowed ‘value’ to be added to the process in terms of capturing the reactions and non-verbal indicators as witnessed by the researcher.

Field notes of observations

Whilst observing any situation it is important to maintain the greatest level of normality possible. The researcher taking copious notes next to the participant could potentially disrupt this normality. Observations were scheduled to last 30 minutes to one hour. However they were timetabled as a two hour exercise to allow for field notes to be written up as soon as the setting had been vacated [Denzin, 1978 & Mellon, 1990]. The field notes contained details of what was heard and seen in the setting. They were a descriptive, not interpretative, account of the phenomenon [Patton, 1990]. Lincoln and Guba [1985] do suggest that there is room in field notes for interpretation but they must be recorded as such. There must be no possibility of these asides becoming confused with the description of what was actually witnessed. Transcribing the notes immediately after vacating the field allowed the interpretative notes to be added as memos inside the observation description.

The situation did occasionally allow for some notes, for example, verbatim quotes, to be written down without becoming obtrusive and closing off access to new information. However, it was necessary not to; ‘allow [the] data collection procedures to cut [the

researcher] off from access to additional data [he/she] may need' [Erlandson, Harris, Skipper, and Allen, 1993 p103].

Participants logbooks / diaries.

The use of participant diaries within LIS research has been largely overlooked, and where they are mentioned they are not looked upon approvingly. Slater [1990] regards them as recorded self-observations and because of this places less value on their role in research in comparison to researcher observations. Slater identifies a disadvantage as; the 'systemization and editing by their creators, at the conscious or unconscious level' [p.123], yet it is precisely this perceived 'disadvantage' which provides the added data that may be valuable to the research [Stake, 1995]. Ellis warns that diaries or logs rely 'on the willingness and ability of the [research participants] to complete the diaries' and that it is 'questionable whether they would [be] able to [do] so comprehensively and accurately' [Ellis, 1993, p.475]. This was an issue with the participants in this study and there is considerable discussion concerning this method in Chapter 8, The Reflective Review, which examines how this method worked in practice. Asking the participants in the research to keep logbooks or diaries of their use of electronic information added to data collection in two ways. They provided confirmation of observations made by the researcher, and they filled in gaps when the researcher could not be present during use of EIRs.

2.3.6 Emergent design.

Emergent design is an integral part of any constructivist inquiry yet it has not been used within LIS as an integral element of the research design that is applicable to both the individual and the setting. Although many studies have discussed the changes made during the research process, it has not been common practice to include the likelihood of change in the initial design. The concept of an emergent design is based upon the belief that the researcher 'does not know what he or she doesn't know' [Lincoln and Guba, 1985. p.209] at the beginning of a study. Therefore it would be impossible to establish the means by which the unknown could manifest itself to the researcher during the course of the study. Because of this a constructivist study allows the research design to emerge as the study progresses. A research model can, and was, developed that allowed for the iterative nature of the study. It took the form of a plan that maintained the focus of the study without precluding the use of individual methods, as they become apparent. This is one area in the inquiry where the

participants could be given a degree of control over the process, leading to a sense of ownership of the study. In the case of this study it was the participant logbooks that demonstrated the most useful application of emergent design, this is discussed in detail in the Reflective Review. Emergent design is an aspect of constructivist inquiry that has been largely overlooked by other studies attempting to place the individual at the heart of the study. 'The [interpretivist] paradigm affirms the mutual influence that researcher and respondents have on each other…never can formal methods be allowed to separate the researcher from the human interaction that is the heart of the research.' [Erlandson, Harris, Skipper, & Allen, 1993. p. 15].

2.3.7 Data analysis

> 'The word derives from the prefix 'ana' meaning 'above', and the Greek root 'lysis' meaning 'to break up or dissolve'. [Bohm, 1983p.156]

As Dey points out, ' there is a difference between an open mind and an empty head. To analyse data, we need to use accumulated knowledge, not dispense with it' [Dey, 1993, p.65]. To carry out inductive data analysis it is necessary to be open to all eventualities and not allow prior theory to drive the analysis. The emphasis though must always remain on theory emerging from the data. In 1992 Glaser claimed that grounded theory was beginning to move away from its original intentions;

> 'Anselm's [Strauss] methodology is one full of conceptual description and mine is grounded theory. They are very different, the first focusing on forcing and the second on emergence. The first keeping all of the problems of forcing data, the second giving them up in favor of emergence, discovery, and inductive theory generation' [Glaser, 1992. p.122].

The method developed by Strauss, referred to here by Glaser, was the high-level analytical device of coding and categorizing. Strauss recently revised the original analytical model to ensure that the data did in fact drive the coding and was not forced into categories that represented a distortion of the empirical evidence. This process of 'microanalysis' involves a line by line examination of the data and begins with 'open coding' to identify categories from the data. This is then followed by 'axial coding' to determine links between categories and sub-categories and finally 'selective coding' may be used to refine the theory generated by the data [Strauss and Corbin, 1998]. This is still referred to as the constant comparative method of analysis and retains the basic principles of ongoing inductive analysis established by Glaser and Strauss in 1967. The constant comparative method was applied in this study as it was deemed to be the method best suited to establishing Grounded Theory.

The constant comparative method of data analysis demands that the creation of categories is driven by the raw data and not established *a priori*, although it is inevitable that prior research will have identified some of the salient issues.

> 'The original version of grounded theory stressed the idea that theory emerged from, and was grounded in, data. Careful analysis of data items using the constant comparative method would lead to the emergence of conceptual categories that would describe and explain the phenomenon under study' [Melia, 1997 p.31].

In order to carry out this careful analysis of the raw data Q.S.R. NUD.IST was selected out of the many qualitative data analysis software packages currently available. This choice was based upon the facilities it offered and the high level of analyst/data interaction provided by the software. Examples of some of the categories and indexing options offered by the software can be found in Appendix 4. One of the major objections to the use of computer software in the analysis of qualitative data is that it isolates the researcher from the data. The package selected for this study demanded that the researcher be in constant contact with the data, whether this was in the form of fully transcribed interviews, observation notes, researcher's log, participant diaries or other relevant documents.

> 'QDA programs neither promise nor threaten to think. QDA's cannot theorize, nor do they automatically create complex data codes. What they can do is improve our relationship to data.'[Durkin, 1997,p92]

Immediately after each interview or observation had taken place the researcher fully transcribed interviews and observation notes. Carrying out the transcription personally allowed the researcher to commence analysis whilst the event could still be recalled. These transcriptions were then interrogated manually by the researcher and initial categories were identified, each category emerged directly from the raw data, the researcher purposely ignored any assumptions or interpretations at this point although notes were taken and retained to be included in subsequent stages of the analysis. In this way the researcher ensured that the data did in fact *jump* and was not *pushed*, categories were not forced, they emerged [Melia, 1997]. The creation of initial categories did not only inform the analysis, it also identified salient issues which needed to be revisited during subsequent phases of the field work.

> 'Important leads are identified in the early phases of data analysis and pursued by asking new questions, observing new situations or previous situations with a slightly different lens, or examining previously unimportant documents.' [Maykut and Morehouse, 1994, p.44]

2.3.8 Member check.

The dialectic aspect of this research was accommodated by interactive workshops where participants were encouraged to compare and contrast the individual constructions of reality by debate. These workshops were conducted in each of the four schools with all participants from that school and the researcher present. Individual participants had been given the opportunity to read both their own stories and the researcher's interpretation of the major themes and issues prior to the workshop. This gave them the opportunity to confirm the credibility of their own stories and examine the cross-case themes as interpreted by the researcher. They are thus given the opportunity to read their own case reports and encouraged to comment on the contents, adding their own interpretations.

> 'Because the realities that will be included are those that have individually and collectively been constructed by persons within the context of the study, it is imperative that both data and interpretations obtained be verified by those persons.'' [Erlandson, Harris, Skipper, & Allen, 1993, p.31]

Stake claims that member checking is a vital component of a study, not just in terms of adding to the credibility of the study, but also in improving the quality of the final case report. He stresses that, 'all [his] reports have been improved by member checking' [Stake, 1995, p.116].

There is some debate on how far participants should be allowed to go in terms of altering what has been said or done but it is the responsibility of the researcher to control this procedure to allow for maximum information yield. In this study the participants were encouraged to scrutinize the researcher's interpretation and comment, these comments were all considered and discussed until agreement was reached between research and participant.

2.4 Summary

The present methodology applied on a number of factors that were *new* to library and information science research. Although the use of qualitative methods has now become widely accepted, the application of these tools and techniques is usually done within the boundaries of positivist axioms.

> 'In the past we tended to rely on a single means of research-based problem solving, that of the positivist, quantitative researcher. While this remains a valid approach, information professionals are now aware that it is but one among many, and has no natural right to be the preferred methodology.' [Gorman and Clayton, 1997, p.32]

Snowball sampling, as used in this study, has not been found in any other LIS research to date. Although it has long been used in Social Science research, it is most commonly

applied in the 'person to person' mode, rather than criterion based sequential selection. Emergent design is sometimes evident in the final report of studies, but it is not stated as a component in the research design from the outset. Prolonged engagement, although not innovative in its own right, is rare in LIS studies due to the costly nature of the fieldwork. When aiming to establish the quality of a study LIS research frequently refers to the traditional criteria of rigour devised for judging positivist research. *Criteria of rigour*[2] cannot be applied to a study conducted within a relativist ontological stance with a subjective and interactive epistemology. Generalisability of the findings of this study are simply not possible, neither does the researcher lay claims to it. The findings of this study can be transferred to other situations if and when the context fits.

'Fittingness' is the basis for transferability as a direct function of the similarity between contexts. 'Fittingness' defined as the degree of congruence between sending and receiving contexts, has yet to be the recommended mode of applying research findings in LIS. The argument is that the aim of this approach to research is to capture the uniqueness of the 'case' rather than to use that case as the basis for wider generalisations. This study uses multiple case studies, capturing the uniqueness of each case and cross-case analysis. This analysis, along with evidence drawn from past research, is used to suggest ways forward. This does not prohibit the readers of this research from transferring the findings to their own unique situations, rather it provides an additional level of analysis which can be used to contribute to the existing knowledge on the phenomena being studied.

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[2] Internal validity, external validity, reliability and objectivity were devised to *test* experimental research, these cannot be applied to a study which does not aim to control independent variables from the outset.

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3 Reflection on Method.

3.1 Introduction

Whilst conducting this review the researcher found it necessary to refer constantly to the original aims of the study in order to establish how far the research went in achieving those aims and how well the original objectives matched the final research process. The original aims and objectives of the study are revisited here to provide a point of reference for the following discussion.

3.1.1 Aims of the study:

- To answer the question; does access to electronic information resources have a role in breaking down barriers to learning opportunities encountered by young people?
- If so, how does it, why does it and what are the circumstances which influence this role? To provide a clearer understanding of the use of these resources.
- To suggest a guide to good practice in managing EIRs and develop a criterion based framework of potential learning opportunities in the electronic information environment.

The purpose of a constructivist inquiry is to discover what it is the researcher does not know and this would suggest that 'it is not a good idea to enter the field with questions that are too specific, or too tight, or slanted' [Ely et.al, 1994, p.56]. However, this researcher was a neophyte constructivist inquirer and therefore followed Stake's recommendation to enter the field 'thoroughly prepared to concentrate on a few things, yet ready for unanticipated happenings that reveal the nature of the case'[Stake, 1995, p.55]. The 'few things' which this researcher focused on during Phase One of the study were the seven objectives identified through an investigation of past research as being of significance to the phenomena being studied, those objectives were;

A set of 7 specific objectives has been established arising from these aims to;

1. identify and evaluate current use of electronic information by young people.
2. establish the current context set by Central Government, LEA, and individual school policies.
3. establish what young people assume they are doing in relation to the process witnessed by the researcher.
4. consider motivation to use electronic information and the effect this has on the participants' learning.
5. establish the level and quality of information skills training available to young people, and examine its application during the information seeking process.
6. examine the conditions that influence use of these resources.
7. establish the conditions under which access to electronic information does impact positively on learning opportunities.

3.1.2 Design of the fieldwork

This study was designed in three phases. Phases Two and Three of the research were very much dependent upon issues identified during Phase One and these could not be predicted prior to the completion of Phase One.

Phase 1 **[Sept 1997 – June 1998]**

Initial contact.	
Consent	via sign-off forms.
Interview	to identify salient issues. [open-ended, exploratory questions looking for an overview]
Observation	of the participant using electronic information sources [again adding to the overview].
Analysis of phase 1	**[June-Sept 1998]**

Phase 2 **[Sept 1998-June 2000]**

Focused exploration,	Interviews [semi-structured, focusing on salient issues without excluding the possibility of new information emerging.] Participant observation Non human sources [researcher's diary, participant logs, policy documents etc.]
Analysis of phase 2	**[June-Oct 2000]**

Phase 3 **[Nov 2000 – April 2001]**

Prepare preliminary case studies.	
Member check.	Case study subject to scrutiny by the participant.

This review will examine each phase of the research in turn and establish areas which proved successful and identify which aspects of the research could possibly have been improved upon or proved to be too broad for the constraints of a doctoral study.

3.2 Phase 1 of fieldwork

3.2.1 Gaining entry

This area was of particular concern to this research as the individual participants were young people and there are sensitive issues to be addressed concerning access to, and observation of, their activities within their own environments. Because of the sensitivity of working with young people the research was to be totally overt during the entire study. Lincoln and Guba [1985] point out that the fully informed consent of the participants is an ethical necessity in any research. In this research it takes on a more prominent role. Originally the example set by Farrell [1988], in his study of high school students in relation to drop out rates, was being considered. Farrell was not only totally overt about the research but he also used various

techniques to involve the students in the data collection and presentation. Participants in this study were involved in data collection and in designing one of the methods of data collection. This will be discussed later in this chapter.

The researcher made the decision to use school as the bounded system of the individual case studies for two main reasons. Firstly school offered access to a large number of young people in the required age bracket. Secondly the school would offer the researcher a third party to act as intermediary for the more formal aspects of the study. The schools then became stakeholders in the study and as they were required to assist in some areas of data collection it was necessary to offer some form of reciprocity. There were no formal written documents needed to identify reciprocity and the level requested differed greatly from school to school. There were four schools involved and the level of reciprocity was as follows:

School 1 - High level. *The researcher consented to carry out an evaluation of a new information system and presented this evaluation to various interested committees at the end of the research. Although this was not anticipated it did provide an opportunity for dissemination of findings that would not have been possible under other circumstances. It also increased the co-operation and interest of the relevant informants within the school to a level that was not originally thought possible.*
School 2 - Medium level. *Consent was given on the basis that the research may be used to evaluate the new intranet which was being set up within this school. This demanded no additional data collection.*
School 3 - Low level. *Consent was given without the mention of any reciprocity at all. It was suggested that the school could use some quotes from the final analysis but they did not request a report of any kind.*
School 4 -Low level. *Consent was given without any formal agreement but the informants concerned did express an interest in both the final analysis and the research process, wishing to be kept informed at all stages of the research and wanting to be involved in the process.*

Although contact had been made with four schools a year before the fieldwork was scheduled to begin, there were unanticipated changes, which meant further planning and establishing new informants:

School 1 was not amongst the original four schools approached at the beginning of the research. A participant from this school was identified from another source, and the school was approached after the participant had given consent to be involved in the research. Once contact was made, it became obvious that this school would provide rich data as they were undergoing a period of great change and introducing a networked information system that involved both the school and the local library authority. The opportunity to study this development through the planning stage to final implementation was a great advantage to both this research and the school. There was no established informant in the school and this

meant a letter to the Head Teacher seeking permission to research within the school. The Head of ICT became established as the gatekeeper. A relationship with both the newly appointed Librarian and the ICT Head were established.

School 2 was also contacted through a letter to the Head Teacher after a meeting with the Librarian to establish the situation within the school. The Head Teacher provided an initial gatekeeper, the Head of ICT. A relationship was established and she worked with the researcher to arrange interviews and observations. The procedures in this school are highly formal and interviews and observations were organised well in advance. It was interesting to note that both of the schools that were contacted through the Head Teacher targeted the Head of ICT as the initial gatekeeper and not the school librarian, although one was present in both locations.

School 3 was contacted prior to the beginning of the research and agreement was reached through the Head Teacher. The Learning Resource Manager then became the chief gatekeeper. Interviews and observations are highly informal at this school. The researcher was free to turn up at any time and make arrangement with individual participants.

School 4 was contacted prior to the beginning of the research. Although staffing did change, the original gatekeeper remained, but there were additional introductions and relationships were established with other members of staff. Arrangements for the researcher to be present were fairly formal at this school and co-operation was high.

The method of contacting individual participants was the same in all schools: Participants were contacted through the school; the researcher provided the selection criteria and likely participants fitting those criteria were identified. This was followed by a meeting with the researcher and all likely participants. From there they were given a brief outline of the research for themselves and their parents. Participants were then identified from this group based on their willingness to take part in the research. Snowball sampling meant that individuals were selected from the initial pool as and when criteria emerged.

The preparation of the necessary consent forms was thought to be a vital part of this research. Erlson, Harris, Skipper & Allen [1993] suggest that they should be as open-ended as possible in order to avoid locking the researcher into a path that may run contrary to the research. It must also be noted that gaining entry does not only include the formal aspects of signing off and gaining permission. It also includes establishing trust and building up a rapport with respondents. This began with the initial meeting and continued throughout Phase One. The researcher established a comfortable rapport with the majority of participants. This extended to involvement with other areas of school life including Sports Day and concerts. As prolonged engagement was a prerequisite of this research, the researcher chose to accept as many invitations as possible in order to build up a closer relationship with participants. This placed an increased demand on researcher time, but because of the nature of the inquiry it was considered appropriate. This is one of the areas which make this type of research considerably more costly than other approaches and it is unlikely that this level of involvement could be achieved in anything other than a longitudinal study.

3.2.2 Sample

The sample map illustrated in Appendix 1 defines the snowball sampling used for this study. In order to build a sample of maximum variation Maykut & Morehouse recommend the technique of snowball sampling 'to locate subsequent participants or settings very different from the first.'[1994, p.57]. The technique used in this research, was to begin with an initial respondent who, through the process of interview and observation, indicated characteristics and issues which warranted further inquiry. These characteristics became the criteria used to identify new cases. There were also issues, which were deliberately contrasted, in subsequent participant identification in order to provide maximum variation. This type of sampling demands a viable exit strategy [Lincoln & Guba, 1985]. As there are no a priori numerical restrictions placed upon the sample, the danger of over-saturation could become highly significant. The purpose of this sample was to maximise information yield. It then followed that termination of the sample could only come when no new information is being added to the inquiry by new samples. This redundancy can be the only criteria for termination. The limit on the size of sample used in this research was initially estimated to be around twelve individual cases because of pragmatic decisions which would accommodate the constraints of the study. However this number grew during Phase One.

Eventually sixteen individual case studies were identified. Although this is often considered a rather large sample for such in-depth study, the researcher felt that it was necessary in order to capture as much relevant data as possible and felt confident in being able to maintain prolonged engagement with this number of participants. The case studies were successful in this study but again this was only possible on this scale because the researcher was able to dedicate considerable time to each case. The aim was to select a sample that would represent the range of experience relating to the electronic information environment of young people. The choice of initial participant could have been highly biased. In order to limit this bias the participant used was in fact the participant used in the 'dry run', and although she was used to identify subsequent participants, she was not included as a case study in the final analysis. The sample was mapped as it progressed and each participant was placed within the wider environment of his/her school and public library authority.

In order to meet the demands of snowball sampling a larger group was identified and informed about the research and individuals were then selected from that wider group as interviews progressed. The time constraints of the study also influenced this decision, as it was necessary to provide sufficient time to allow for one year in the field with each participant. This allowed only a two-month window for identification of each participant. Although this could have proved to be a significant problem, due to the co-operation of the schools and the flexibility of researcher time, the goal was achieved within the planned time scale.

3.2.3 Initial contact

In all but one of the sixteen cases, initial contact was made through school, this being seen as the least contentious method of locating and recruiting cases. The greatest disadvantage to this method of identification was the likelihood of individual participants assuming the research was concerned only with school-related activity. But it was possible, because of the length of time in the field, to eventually establish the central focus of the investigation as the individual. When young people are involved it is important to attend to ethical issues. This was done through the schools, and they informed the parents and gained consent from both the young people and their parents. Each participant was given an outline of the research which gave details of the data gathering process and approximate time scales for each of the activities involved. There was also an informal meeting with the researcher before they

agreed to take part. This served a dual function. Firstly the participants could ask questions about the research and clarify any issues they, or their parents, were unsure of. It also gave the researcher the opportunity of meeting the participant and explaining the study in a more informal manner. Although all participants knew they were still free to withdraw from the research none chose to do so after the initial meeting.

3.2.4 Interviews

Open ended, exploratory interviews were carried out with all sixteen participants, the original guide for this interview was subject to two changes during Phase One of the research, based upon data from the preceding interviews. Because of the iterative nature of this research it was necessary to examine each interview and carry out initial analysis of both content and method. This was constant throughout Phase One. The first major change involved introducing more questions of the 'Grand Tour type' [Spradley, 1979] at the beginning of the interview. There were three reasons for this; to discover background detail on the individual, to relax the participants by easing them into the interview situation, and to establish that it was personal responses that were being sought, not answers to questions that could be 'right' or 'wrong'. The first three interviews, although successful in terms of information yield, were dominated by the participants interpretation of the researcher's role. Because of the school situation the researcher was seen as another authority figure asking questions. '*It was difficult to make Bill comfortable, he was very conscious of the teachers who passed through the room and appeared to be trying to answer the questions as if he was in an oral exam.'* [*Research Log, p. 52*]. The introduction of questions about the participants' hobbies, career aspirations and general feeling about their school environment, had a definite impact on the rest of the interview for the remaining thirteen participants.

During these interviews it became clear that there was a language barrier caused by the different interpretations of information related. The second change to the interview guide was to adapt the phrasing of questions to fit the participant on an individual basis in order to facilitate mutual understanding of the issues in question. There were no generic sets of questions that could have been put to the participants in the form of some other research instrument that would have produced the same level of rich, descriptive detail gained during the interviews. The researcher was constantly adapting to the participant during these

interviews. This also assisted concentration levels as it was impossible for the researcher to become passive during the interviews.

3.2.5 Observations

Two types of observations were used during Phase One: unobtrusive non-participant, observations and semi-participant observations with the researcher interacting to a certain degree with the participant in order to begin to experience the reality of the participant. The non-participant observations took place in each of the schools during lunch breaks and after school. The participants were observed in areas which provided open access to EIRs. Usually the Learning Resources Centre or some other area dedicated to open access IT facilities. These observations allowed the researcher to witness contextual settings and social interactions from a distance, as well as the behaviour of each of the participants.

It was originally hoped that semi-participant observations could be carried out in every setting where the partipants were using EIRs. This did not happen during Phase One. There were three typical settings used by participants; school, home and the public library. The school and the public library were both acceptable setting for observations but as most participants' home use took place in the privacy of their own bedrooms, the researcher decided that this setting would not be suitable for observation early in the fieldwork. There were two main reasons for this; the presence of an unfamiliar adult in their most private setting would cause severe distortions to the data, and the researcher did not wish to be placed in such a potentially vulnerable situation at such an early stage in the research. One participant was interviewed and observed at home because initial contact was made through the parents. The data gathered in this setting indicated that there would be advantages in using this setting in Phase Two.

3.2.6 Search logs

Each participant was given a personal Search Log in which to record any searches for information using electronic resources. This was done to contribute to triangulation of data collected, by providing the student perspective without the direct involvement of the researcher. At the end of Phase One, only two of the sixteen cases had begun to use their logs to keep a record of their searches. They were happy with the organisation and format of the log and thought that the information provided in the log was clear and provided them with a valuable framework for recording their work. The fourteen cases who had made no

entries gave a variety of reasons; 'I haven't done any research projects.' 'I forgot what to do', 'it interferes with my work', 'It takes up too much time.', 'I can't be bothered.' and 'I don't want to walk around with a great big yellow book, I feel stupid'[*Researcher Log, p.102*]. A focus group meeting was held at each site to decide what could be done about this problem. The researcher explained that what was needed was a detailed account of searches carried out when the researcher could not be present. It was to be a surrogate for the observations they were now accustomed to. Very productive discussions followed and participants identified ways in which they thought the Search Log could be a more effective tool. The suggestions were; a hand written diary in their own words, a database using Microsoft Access, a diary kept in a Microsoft Word file. One participant requested an audio tape so he could describe his actions verbally [*Researcher Log, p. 119*]. Unfortunately the economic restrictions of the research would not permit this last suggestion although it would have been a very interesting data collection method. The researcher agreed to logs being kept in one of four ways; databases, notebooks, word-processed documents, and the original log design. The Search Logs provided a rich source of data and were well maintained throughout the research, the level of involvement in the design of the log by individual participants played an important role in the quality and quantity of information provided from this source. They had become stakeholders in the research and this appeared to encourage vigilance in maintaining the logs.

3.2.7 Researcher's log

A Researcher Log was maintained throughout this study. Entries only become daily and detailed from the date the actual fieldwork began. Prior to that entries were more sporadic, based largely on theoretical concerns, both methodological and phenomenological. Many researchers advised the use of a log or reflexive journal. Ely goes further than this and gives the log a central role in both data collection and analysis as they 'contain the data upon which the analysis is begun and carried forward. It is the home for the substance that we use to tease out meaning and reflect upon them as they evolve'[1994, p.65]. During Phase One of the research, the log proved to be an invaluable tool. It provided the arena for ideas to be tested and assessed. It also acted as a place of retreat to reformulate plans and it provided an accurate and up-to-date account of the fieldwork that could not have been achieved through any other means. The discipline involved in keeping entries consistent, in this case on a daily basis, focused the research and brought order to a process that could so easily have

become fragmented. Ideas and observations that could have been lost in the ever-growing mountain of field notes, literature searches, and notes on methodological decisions. It produced a record of every event in this study to which reference could be made, as well as playing a part in the development of theory as it emerged.

3.2.8 Data analysis

Constructivist inquiry requires that data analysis begins with the collection of the first item of data and continues throughout the research process. This research was likely to produce a vast amount of qualitative data: interview transcripts, observation notes, participant logs, researcher log, policy documents were all expected from the fieldwork. Because of this, the decision to use a qualitative data analysis software package was made prior to the beginning of the fieldwork. The package selected for this analysis was QSR. NUD.IST. The package offered a high level of data-researcher interaction, detailed data indexing and the ability to adapt to new data as it was collected. Criticism of using computer software for qualitative analysis usually focuses on claims that it can create a barrier between the researcher and the data, removing the researcher from immediate contact. QSR NUD.IST does not allow this to happen. The package demands reading and constant re-reading of the data in order to index the text to predefined nodes and trees. These predefined nodes and trees can be rearranged, removed and made increasingly more intricate as more data is collected, never restricting the researcher to a limited number of indexing possibilities. Phase One provided data that allowed an initial indexing scheme to be established and provided a working structure around which grounded themes began to emerge. As an analysis tool it proved to be ideally suited to this type of inductive analysis and mode of inquiry which demands that the themes emerge directly from the data and are not *forced* by a highly specified and rigid analysis structure.

Data does have to be formatted correctly for input into a QSR NUD.IST file and it is important to consider this at the earliest stage possible. Reformatting data after it has been input into a word processing file can be a time consuming activity, and one that is likely to impinge on the timetabling of any research project. The decision to use this package was made early in this research and documents were prepared in a form suitable for direct input into the package. There were some instances when this was not possible because of the nature of the data, for example the participant logs were produced in a variety of ways and

had to be consistently transcribed for the package. This needs to be built into the research timetable in advance as subsequent fieldwork is highly dependent upon the analysis of all that has gone before. The most advantageous aspect was the ability to store all of the data in a single NUD.IST file which could be accessed swiftly and accurately. Because of the nature of this study the researcher carried out all interview transcription and document preparation immediately after data collection. This provided for a far greater level of interaction with the data than could have been achieved if the researcher had used others to transcribe the data. The transcription process allows the researcher to begin the analysis, making notes on events, which occurred during the interview, but which are not recorded and expanding observation notes almost immediately after the observation had taken place. Categories and codes are often identified during this process and these acted as the framework for the more formal analysis procedures.

3.2.9 Summary of Phase One.

Phase One of the research was completed to timetable. All participants were identified and initial interviews and observations were carried out within the specified time scale of the project. Initial interviews provided valuable data to progress to Phase Two of the research and relationships were established with all participants and relevant informants at this stage in the process. Phase One demonstrated how difficult it was to conduct non-participant observations on a one to one basis. This type of observation worked best when observing a larger group, or whilst observing the interaction between individuals. The researcher was not able to observe individuals without being asked questions or becoming engaged in conversations about the procedure and information content. The advantage of this is that the researcher was able to learn a great deal from the questions being asked and was able to develop the rapport with participants. The disadvantage at this stage was that there could be a possibility of the researcher *getting in too deep*. Relationships with the individuals need to be close enough to allow for trust and empathy but the role of the researcher as researcher must be maintained. It became clear during Phase One that there was a likelihood of empathy turning to sympathy and possibly moving on to advocacy, as the relationships became stronger. This was identified as an issue which needed to be closely monitored during Phase Two.

The involvement of individual participants in the actual research design, in the case of the logs, proved to be a valuable tool in giving them a sense of ownership of the project. They felt empowered to speak out and not assume that every decision made by the researcher was necessarily the *right* decision. Phase One created a solid foundation for the in-depth study which would develop throughout Phase Two.

3.3 Phase Two of the fieldwork.

A review carried out when all case studies had reached the end of Phase One did not reveal any areas of major reorganisation within Phase Two. It was carried out as initially indicated. However there were some issues that emerged from Phase One in relation to interviews, observations and participant logs. It was also decided to add one more data collection method that had not been previously anticipated. The researcher requested participant autobiographies during Phase Two.

3.3.1 Interviews.

There were two more in-depth interviews with each participant carried out during Phase Two to clarify and expand upon data gathered from the first interview. As originally anticipated the guides for these interviews were based on participant responses to questions asked during Phase One and were unique to that participant. Each guide was developed using the analysis of the initial interview as a starting point. Although there were some obvious similarities between the guides no two guides were exactly the same. This was due to the complexities of the individual environments being studied. From this point on the use of generic guides within the research framework became redundant. Although the path of the research remained consistent across cases, within each case emphasis was on the individual. Interviews were conducted based on individual issues to create rich pictures of each case. The use of an algorithm in the interview guide proved highly effective during Phase One and this design was retained for all future interviews.

During Phase Two, once salient issues were established, formal interview with informants were designed to solicit information relevant to individual cases. These informants were: School Librarians / Learning Centre Managers at all sites, IT teachers, Librarians in the public sector and parents. These interviews proved to be difficult in terms of the actual arrangements, but once times and dates had been established, the actual interviews were

successful in the majority of cases. Some informants appeared to feel rather threatened by some of the questions and were often quite defensive about their service. At the end of the fieldwork the researcher met with all informants and confirmed comments made during the fieldwork, seeking consent for these comments to be used in the analysis of the findings. Although no major changes resulted from this member check, it was considered an ethical element of the study as some of the comments were made in what could have been assumed were casual settings. Having confirmation of this kind strengthened the validity of the comments as data sets in the analysis.

3.3.2 Observations.

During Phase Two observations were in the form of non-participant observations of group activity, and semi-participant observations involving think-aloud protocols. Non-participant observations were carried out in areas that provide open access to IT facilities. These observations were primarily concerned with social dynamics, in particular peer and tutor interaction, although this did not exclude any issues which emerged in relation to the individual. Relationships had been developed as a goal of Phase One and these relationships removed the *distance* necessary to conduct non-participant observations on a one to one basis.

Semi-participant observations were carried out in a number of settings: school, public library, and home. Although the researcher had been wary of home observations this became acceptable to twelve participants during Phase Two because of the relationship which developed during the fieldwork. The researcher was invited into the home by these participants themselves and accepted these invitations on two grounds; the context would provide valuable data not available elsewhere, the researcher wanted to maintain the high level of researcher-participant interaction that had been established. These observations involved the participants being asked to talk aloud about the decisions they are making and the feelings they are experiencing during their searches. This focused the participants on their own actions. Very often the actual process of verbalising thoughts and actions allowed the participants to identify possible mistakes and concentrate more intensively on the process. It would be impossible to claim that the researcher did not influence these situations. The physical presence of an adult inhibited the participants to some extent but this was minimised by the level of contact and the almost monotonous regularity of visits

and shared information search activities. All of the participants in this study became familiar with the researcher to a greater or lesser extent and, although this was encouraged and indeed is demanded by this type of inquiry, it also brought consequences which will be discussed in relation to exiting the field.

3.3.3 Participant Logs.

Phase One highlighted a number of problems with using participant logs as a means of data collection, it became evident that what the researcher saw as an ideal form of data collection did not fit with the views of participants. Working together with the participants to identify a number of alternatives to the collection of this particular data not only assisted the data collection process, it also increased the participants' sense of ownership of the study. It was necessary to make it very clear that this study was not concerned with *right* and *wrong* answers but with reality as they saw it. Being involved in the design of the study alerted the participants to the fact that the researcher was not conducting controlled experiments. It was an exploration not an experiment. The participant log remained in its original form for a number of the participants, they were happy with the arrangement and wanted to continue using them. A database was designed by one participant and was used throughout Phase Two. The design was compatible with the arrangement of the hard copy version which assisted in the analysis. A number of participants kept personal diaries of their search activity. These were unstructured and the entries were in whatever form suited the participant. These diaries were maintained in either hard copy note books or as word processed documents according to the preferences of the individual. This final method proved to be the most difficult to analyse. There was little, if any, structure to these diaries and they had to be read and re-read in order to identify the data content. This variety of form also created additional work when preparing the data for input into NUD.IST but the additional time involved was again vindicated by the richness of data obtained, which would have been lost if there had not been some degree of flexibility in the original design.

3.3.4 Researcher Log.

The researchers' log continued to be an integral part of the study. It was kept up to date during the whole of Phase Two and analysed along with every other document in the data collection. This log took up a considerable amount of time and decisions about its functionality were considered in the light of the cost in researcher time. There was no

available alternative that would reduce the time involved. All other possible methods of recording this data would have involved the researcher in dedicating an equal amount of time to the exercise. Therefor this remained the primary method of recording the research process, it suited the researcher and provided a written account of all activity. The log was in two parts. Firstly, a reflexive journal which provided a place of retreat for the researcher, somewhere to formulate ideas, speculate about emerging themes and discuss the methodology. Secondly, the research log was a daily timetable of the fieldwork, a place to organise the logistics of the study. This log formed the basis of the final audit trail, which can be found in Appendix 3, as well as assisting in the final analysis.

3.3.5 Document analysis.

Collection and analysis of policy documents formed a large part of Phase Two. There was some concern initially that the researcher was being *'put off'* by a number of informants but persistent request for the relevant information eventually provided the necessary documentation. Some of the informants were prepared to admit that these documents had not existed in a form they would have been prepared to share with an outside observer. They were not written specifically for the researcher, but the requests made by the researcher certainly appeared to act as a catalyst. This had implications for the research and needed to be mentioned in the analysis. Informants agreed to this although they did appear somewhat uncomfortable about it. This was the only area of data collection were compromises had to be made in relation to the amount of text input into the analysis package. Some of the documents could be directly transcribed and loaded into the NUD.IST file but it was impossible to do this with every data set. Some had to be analysed manually using the NUD.IST index tree. This was a lengthy process that ultimately extended the analysis period beyond the specified timetable.

3.3.6 Participant autobiographies.

This was an additional method of data collection not identified at the outset of this study. There were two major reasons for using this method; obtaining personal information that the participant was comfortable sharing, and establishing the participants personal view of themselves and what was important to them. The researcher did not want to include questions in the interview guides that could possibly cause unnecessary discomfort to the participant or appear too intrusive. This could have disturbed the rapport that had been

established and the researcher could have appeared to be probing in areas that were of no apparent use to the study. It was also important that the researcher established an understanding of the things the participants regarded as important to them, not issues identified by the researcher. The autobiographies did provide some useful information but they were not as enlightening as was first hoped. Many of the participants provided very little detail on their personal thoughts and feelings. They provided detailed accounts of events from their birth to their current favourite hobbies and best friends. The information was used in the analysis but the tool itself was of very limited use. This should have been anticipated by the researcher, the age of the participants and their familiarity with producing this type of work for assessment purposes naturally restricted the content.

3.3.7 Exiting the field.

An exit strategy had been designed early in the research process. Information redundancy was to be the predominant criteria for leaving for the field. When all data collection tools ceased to reveal any new information then it was time to close the fieldwork. This was also tempered with the time restrictions on the study. One year was given to the fieldwork initially although this could have been extended if it had become necessary. This was not the case because information redundancy was reached within the allotted time scale. However it became clear during Phase Two that exiting the field was not going to be the clinical process described in the original timetable. The participants in this study had become involved in the research process to an extent that was beyond the past experience of the researcher. The rapport necessary to carry out in-depth case studies places a great deal of responsibility on the researcher to simultaneously develop a strong rapport with participants and remain removed from the situation. This was more difficult than was originally assumed. During Phase Two the researcher began to refer to the end of the field work on more and more occasions, in order to clarify with participants that it would indeed be coming to an end at some point. At the beginning of the fieldwork each participant had been given a study outline. Dates were included in this so they had a very definite picture of the structure of the study. Once it became apparent that information redundancy was imminent the researcher began to mention the end of the fieldwork and refer back to the original outline. A definite date was given for the final observations in each case, however, in two cases the researcher returned to observe the participant on their specific request. In both cases the participants had acquired a new skill and wanted to share it. Although this does not conform to usual

research procedure the researcher was led by personal interest to return. Emails continued to arrive after the deadline and finally the researcher decided that the most appropriate action was to hold a *farewell meeting* in each location. There can be no attempt made here to diminish the relationships built up during this research. The researcher did establish a bond with all of the participants involved in this study. The farewell meeting took the form of a final feedback session. The research process and the major themes of the research were discussed by all participants and the researcher gave each participant a small gift as a token of appreciation for their involvement in the study. Ironically this was a book. In an inquiry of this nature it is vital to establish an exit strategy from the outset, it is not something that can be left to chance or can be formulated at the end of the study. That strategy may well change in form but participants need to have some idea of final closure. Phase Three was intended to act as a member check to confirm research findings, this was done individually with each participant, but the farewell meetings also provided a group perspective on the issues raised.

3.3.8 Summary and review of original objectives.

The feilwork were completed within the original time scale although achieving this was at times difficult. It was impossible to predict from the outset the quantity and quality of data that would be collected in this inquiry so building in time for additional analysis became a necessity. The iterative nature of the data analysis and emergent research design allowed the researcher to explore themes and concepts as they emerged making it possible to follow leads and probe deeper as and when appropriate. This mode of inquiry is both time consuming and costly, although it has been highly successful in the context of a doctoral study, the researcher would accept that it is not always possible or pragmatic to apply it to other contexts without some modification.

In order to establish the level of success of constructivist inquiry in meeting the aims of this study, each of the eight objectives outlined in the introduction will to be examined in relation to this review.

1.Identify and evaluate current use of electronic information by young people.

Although constructivist inquiry is concerned with multiple realities, these realities are time and context-bound. It was necessary to establish the wider context of these cases in order to situate them in their own, multi-layered, environment. This was accomplished through the

use of interviews, observations and think-aloud protocols which allowed the researcher to identify sources of information and the trends in patterns of use by these participants. The extent of contemporary use was identified in two ways: National trends were identified through literature reviews of large scale surveys and market reports. The evaluation of use was carried out at the local level using the sixteen case studies. It was necessary to look at local and national trends in patterns of use in order to establish the current context.

2. To establish the current context set by Central Government, LEA, and individual school policies.

Because of the high level of activity in this area it was necessary to monitor the literature throughout the research study. New initiatives and planning documents were developed at all levels during this study and this remains an ongoing process. It was necessary to revisit this area after the fieldwork was complete in order to include the most recent developments. Central Government documents were collected and examined, including both policy documents and reports of new initiatives. LEA documents were difficult to obtain and even after they were obtained it has to be recognised that not all schools fall under local authority control, as was the case with two of the schools in this study. It was also necessary to examine Public Library Authority policy documents in relation to their provision of access to EIRs to young people. Valuable research carried out on a national level provided a rich source of data for this study. School policy documents were collected: School prospectuses and documents relating to IT and Information Skills policies were eventually obtained and analysed but these were difficult to obtain. The researcher had to be persistent in requesting these documents and this in itself had implication for the analysis of the data.

3.Establish what these young people assume they are doing in relation to the process witnessed by the researcher.

Phase One formed the foundation of this objective in terms of initial interviews. At this point the participants discussed their own behaviour using their own frames of reference. This established the signposts used during Phase Two. This second phase provided the necessary opportunities to achieve this objective. There was disparity between accounts of the search process as related by the participants and actual behaviour witnessed by the researcher. Again this confirmed the choice of multiple methods of data collection. It also indicated that there was a firm perception of electronic information use that remained even when the reality of the situation contrasted with this perception.

4.Consider motivation to use electronic information and the effect this has on the participants' learning.

Although this area was targeted during Phase One it was during Phase Two that it became a major focus, issues were identified during Phase One and were monitored more closely as the fieldwork progressed. There were considerable implication concerning what motivates use and how this influences learning opportunities.

5.Establish the level and quality of information skills training available to young people, and examine its application during the information seeking process.

The level and quality of information skills training available to the young people in this study has been established and its application was a focus of the study during Phase Two. This has been identified as a major theme of the research with strong implications for the conclusions and ways forward as recommended by this study.

6.Examine the conditions which influence use of these resources.

This was another element of both phases of this study. Questions in the initial interviews did approach this area but in-depth exploration depended upon the subsequent interviews and observations to examine these conditions more closely.

7.Establish the conditions under which access to electronic information does impact positively on learning opportunities.

This has been one of the fundamental focus points of this study and could only be examined in-depth after the case studies were written up in full. Some of the positive impacts of EIRs on learning opportunities have been identified by this study.

3.4 Summary.

When this study began the type of inquiry selected here was labelled ‘naturalistic’. During the course of this research that name has now become ‘constructivist’. That in itself indicates that the paradigm which influences this methodology is still in the process of developing. It was referred to as ‘the emerging paradigm’ [Erlandson, Harris, Skipper, & Allen, 1993 p.5], and the question raised here is; how long can something continue to emerge before it has *arrived*? Constructivism has now arrived, complete with its own preferred research instrument, its own practice of emerging design and theory generation in the form of working hypothesis leading to deeper understanding. The axiomatic underpinning of this paradigm is now well established and this matches the criteria for judging the quality of research carried out within this paradigm. This would indicate that the

paradigm has now ceased to emerge and has now arrived, but that is not to say it cannot continue to develop. The use of constructivist inquiry to answer the question 'does access to EIRs impact on learning opportunities?' has provided a rich picture of the current situation which can be transferred by the reader from the local to the global level. It has also identified cross-case themes and provided suggestions for ways forward. In that sense it has been successful, it has also been lengthy and costly, a consideration that has to be weighed next to the amount of insight offered. This form of research inquiry is expensive and demands a high level of researcher involvement but it offers a level of insight that could not be gained using any other approach to the research process.

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4 Information behaviour

4.1 Introduction

The primary concern of this study is the role of EIRs in the provision of learning opportunities for young people in the final years of compulsory state education. As such, it is a study of the use of these resources and their potential in affording learning opportunities to individual students.

The term *electronic information resource [EIRs]* is used here to represent any information which is available via a computer screen and requiring electronic processing. This includes *electronic text*, meaning any text which is presented to the user via a computer screen and stored and processed digitally; *hypertext,* referring to an electronic form that supports linking of text and/or graphics in any order and *hypermedia;* which is a combination of text, graphics, sound and animation that has no paper equivalent [Dillon, 1994]. Wilson [1999] defines information behaviour as 'those activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information' [p.249]. Marchionini [1995] defines information seeking as ‘a process in which all humans purposefully engage in order to change their state of knowledge’[p.6]. ‘Information seeking is a fundamental human process closely related to learning and problem solving.[p.7]. Definitions that will be applied in this chapter are as follows:

This chapter discusses past research on *information behaviour* and *information seeking behaviour* in order to situate this present study within an already established framework and identify a contextual map to serve as a focus for primary data collection. The discussion also focuses on the impact of individual approaches to learning on information behaviour, although approaches to learning are dealt with in more detail in the following chapter. The discussion then moves on to information behaviour specifically related to the electronic information environment and potential negative barriers and/or positive drivers for learning opportunities within this environment.

4.2 The information behaviour of young people

Although there has been a shift towards 'person-centred' studies, the majority of these have ‘focused on adult users rather than students’ [Chen, 1993, p.33]. There have been some notable exceptions to this in recent years. Latrobe and Havener [1997] make particular reference to the work of three researchers, ‘work by such researchers as Kuhlthau, Pitts and McGregor has provided important insight into the research process of young people’ [p.189]. There remains a great deal more empirical evidence available about adult users. Children's 'spontaneous use of the Internet and their attitudes towards it hardly appear to have been addressed' [Williams, 1999. p.315]. Other researchers have studied the information behaviour of students within specific electronic environments, [Borgman et al, 1995; Chen, 1993; Large et al 1995; Marchionini, 1995; Neuman, 1995; Solomon, 1993; Yang, 1997; Yuan, 1997]; all of whom concentrated on a single, specific system, excluding, by design, all other information resources. Other studies have concentrated on various aspects of the individual student's social and personal environments; Burdick [1996], Ford & Miller [1996], Jacobson [1994] and Poston-Anderson & Edwards [1993]. They all considered the impact of gender issues on the information behaviour. Influences of social class and race on the process have been examined by researchers such as Martinez, [1994] and Sutton [1993]. Within recent years there has been increased research activity into children and the Internet but this is still very new and relatively disparate [Williams, 1999].

With only a few exceptions, most of the research in this field concentrating on children and young people has focused on information behaviour in response to specific, pre-determined tasks, [Latrobe & Havener, 1997]. As Yuan [1997] points out ‘most end-user studies aimed at searching behaviour have focused on descriptions of behaviour or performance on a particular set of tasks’[p.219]. By setting tasks for the user, 'need' is provided for them, so eliminating any possibility of examining 'need' as perceived by the user. Tasks most typically used in these settings have been library research projects [Kuhlthau, 1991. Burdick, 1996], specific research questions [Chen, 1993, Large et al, 1995 Neuman, 1995, & Yang, 1997], and subject search topics [Borgman,et al. 1995]. The intention of this study is to examine the whole process as experienced by the student as, according to Pitts [1995], ‘setting up an artificial information problem would result in obtaining information only about that artificial situation and not about decisions students make in real life’ [p.178].

There is currently no research available which has combined all social and personal environmental influences surrounding the individual, in a natural setting, focusing on the student in real-life situations not related to a specific system, setting or resource and over a prolonged period of observation. Wilson and Walsh [1996] carried out an extensive review of information behaviour from an inter-disciplinary perspective, which has provided a general model of information behaviour [Wilson & Walsh, 1996, p.37]. This model provides a broader overview of information behaviour, which will inform both the data gathering and data analysis of this research.

4.2.1 Models of information seeking

Eleven models have been selected to highlight and emphasise different aspects of the dynamic nature of the information-seeking process and provide different levels of analysis to examine the process from the users' perspectives. The majority of the models were developed through empirical research, which is in keeping with the principles of grounded theory. The models selected for this review include those specific to children and young people but also include others that were developed through research into adult users. This was done to allow for any insight into both research approach and research findings to inform this present study. These models are shown in figure 3.1. Because of their diversity, they will be discussed here through three basic stages; *initial task, mid-point tasks* and *closing tasks.*

Mick, Lindsey &Callahan 1980	**Marchionini Shneiderman 1988**	**Ellis 1989 Ellis, Cox & Hall 1993**	**Kuhlthau 1989/91**	**NCET 1989**	**Guthrie & Dreher 1990**	**Marchionini 1992**	**Pitt 1995**	**Herring 1996**	**Ellis & Haugan, 1997**	**Yang 1997**
Environment /attitudes ↓ Situation	user	starting	initiation	decide	Goal formation	define problem	Selecting topic	Purpose	surveying	selecting
Stimulus	setting	chaining	topic selection	look	category selection	select	refining topic	Location	chaining	executing
Need	task domain	browsing	exploration	select	information extraction	articulate problem	identifying need	Use	browsing	interpreting
General action plan	search system	differentiating	focus formulation	retrieve	integration	examine results	understanding the task	Self-evaluation	distinguishing	judging
General action plan	outcomes	monitoring	information collection	process	recycling	extract desired information	seeking information		monitoring	retain/reject
Evaluation of action		extracting	presentation	record			capturing information		extracting	
		verifying		review					filtering	
		ending		present					ending	
				evaluate						

Figure 4-1 Models of information seeking.

Initial tasks.

Although both Wilson [1994] and Westbrook [1993] agree that 'needing' is the prerequisite for any definition of an information user, as it is the response to that need which triggers off the entire information-seeking process, not all models make specific reference to that need. Few of the models identified by this review make specific reference to *'need'*. That is largely

because the researchers involved were concerned with the process of information seeking, not an analysis of the motivation or need which provoked the behaviour [Wilson, 1994]. In fact, as has already been discussed, many of the studies explicitly provided the 'need' in the form of a problem to be solved by participants in the study.

Marchionini [1995] points out that 'the information seeking begins with the recognition and acceptance of a problem and continues until the problem is resolved or abandoned.'[p.49]. Although neither the original model created in collaboration with Shneiderman [1988] nor his own amended version [1992], make specific reference to 'need'. It is indicated by his stage *'define problem'*. The Marchionini [1992] model was more concerned with the interactive processes experienced within a hypermedia environment than the previous model [Marchionini & Shneiderman, 1988]. This original model emphasised the motivation and purpose of the user linked with training and previous experience, rather than the process itself. The *need* could be seen as *why,* the purpose of the action. This would then include the PLUS model, which was applied by Herring [1996] in which *Purpose* referred to the specific reason behind an investigation, whether that be school related or personal. The PLUS model was not a result of primary research, but was devised from previous research to be applied within a school setting to guide information skills training.

Search initiation could be defined as the point where the user moves from the conceptualised need to determining how that need can be met. [Westbrook, 1993]. The NCET [1989] model defines the first stage in the process as the point at which the user decides 'what information is needed', then the need to look for relevant information. It is then suggested that individual resources be selected after this stage. The '*look'* stage appears to be more concerned with looking at individual resources rather than any specific information. This would be more in keeping with other models.

Ellis is the only researcher to explicitly use 'starting' as a stage in the process describing it as 'encompassing activities characteristic of the initial search for information' [Ellis, Cox, & Hall, 1993 p.360]. His more recent model uses the term 'surveying' to describe the 'initial search for information to obtain an overview of the literature…or to locate key people' [Ellis & Haugan, 1997 p.395]. This stage is similar to Kuhlthau's *'initiation'*, which she explains in terms of the recognition of a need for information and identifies the feelings of uncertainty

and apprehension common at this stage in the process [Kuhlthau, 1991]. Her *'selection'* stage would also fit into this search initiation, during which the study participants had to identify and select the general topic and the approach they would take. 'Kuhlthau's research was unique in the sense that it explored the process of conducting library research from the viewpoint of the information user.' [McGregor, 1994 p.69]. At this stage Kuhlthau discovered that students selected topics they 'judged to have the greatest potential for success' based on 'personal interest, assignment requirements, information availability, and allotted time.' [1991, p366]

The search initiation tasks identified by Guthrie and Dreher [1990] are *'goal formulation'* and *'category selection'*. This model emphasised the cognitive process of extracting information from documents rather than seeking out and locating sources of information. It concentrated on the analytical skills of the subjects and their ability to extract, verify and retain or reject information based on those judgements. Yang [1997] studied how novice learners found and extracted information from a Greek history database, *Perseus,* building on previous work by Marchionini [1995] into the same system. Yang identified *'selecting'* as the only initiating task in the process. This could again be explained by the user not having to formulate a need [questions were provided by the researcher], and not having to identify a resource [Perseus was the only database on offer to the subjects during the study].

The actions described by the various models at this stage in the process may range from lengthy investigations to brief and even casual interactions, but however this stage is encountered, it is crucial to the entire process. Of all the resources available to the user, personal contact seems to be the most significant in this search initiation stage [Chen, 1993; Ellis, 1989; Ellis, Cox & Hall, 1993; Ellis & Haugan, 1997; & Pitts, 1994].

Mid-point tasks.

The most sophisticated and complex of these models are those identified by Ellis [1989], Ellis, Cox and Hall [1993], and Ellis and Haugan [1997]. These models involve '*chaining*', '*browsing*', '*differentiating*' and '*monitoring*', all within this mid-point. The latest model has replaced the '*differentiating*' stage with '*distinguishing'*, which is described as the point in the process where 'sources are ranked according to their relative relevance' [Ellis & Haugan, 1997. p.395]. Although the stages identified by these models 'can be used to describe any

individual pattern of information-seeking behaviour' [Ellis, Cox, & Hall, 1993 p.359], it demonstrates a level of research experience that would be difficult to transpose onto the information-seeking behaviour of novice learners. As Marchionini points out;

> 'All humans develop some degree of expertise in general cognitive abilities such as problem solving, learning, planning, decision making, and information seeking. In the case of information seeking, our personal information infrastructures develop as we gain expertise in various domains and operate in an information-intensive world.' [Marchionini, 1995, p.68].

Yang's [1997] 'executing', 'interpreting', and 'judging' are similar to Guthrie and Dreher's [1990] 'information extraction' and 'integration'. At this stage Yang found that 'a search might trigger a competing or more compelling idea, enabling or enticing the subjects to change direction, set aside, forsake, or even forget the original focus of their search' [p.81]. It is during this action stage that Kuhlthau identifies 'the turning point of the ISP [information search process] when feelings of uncertainty diminish and confidence increases' [Kuhlthau, 1991,p.367]. 'Focus formulation' is the central task within the Kuhlthau model, one which can point to the success or failure of the entire process [Burdick, 1996]. This could be said of all the models during this stage, but Kuhlthau is the only researcher to point out how crucial this stage is to the user. Despite this the research showed that 'half of the academic, public, and secondary school libraries studied did not show evidence of [users] reaching a focused perspective of their topic at any time during the search process' [Kuhlthau, 1991, p.369].

Pitts [1994] referred to the tasks within this stage as *'seeking information'*; *choosing information'* and *'capturing information'*. She found that students could form a focus at any point during this stage and that exploring the information did not always lead to this focus formulation. Very often Pitts found that students relied on prior knowledge or beliefs and maintained this until the information finally forced them to alter that focus [McGregor, 1994]. This is supported by the mid-point tasks identified by Herring [1996] as *location* and *use.* These are very broad categories used to include the selection of relevant resources and the location of relevant information from within those resources. Herring includes selecting and rejecting information through scanning and note taking as well as the presentation of the information within the area of *use.* Herring does not see presentation as a closing task, it remains a component of the *use* of that information.

Closing tasks.

Few of the models discuss the decision to stop the search for, or collection of, information. Kuhlthau does not make specific reference to ending the search but the act of deciding is implicit in her 'information collection' stage. In the Ellis, Cox and Hall model [1993] the final tasks in the process were *'verifying'* and *'ending'*, the more recent model using '*filtering*' to describe how research participants used their own criteria as a means of making 'the information as relevant and precise as possible' [Ellis & Haugan, 1997, p.399].

Yang [1997] describes the end of the search once 'the information was retained based on criteria such as relevance, usefulness, meaningfulness, clarity or completeness; or it was rejected, because of its redundancy or irrelevance' [p.81]. Mick, Lindsey, and Callahan, use the *'evaluation of action'* as the closing stage in the process, their research also showed that the success of this evaluation will influence the user on whether or not to repeat the behaviour on subsequent occasions [Mick, Lindsey & Callahan, 1980]. Herring is very explicit about ending the search, closure cannot be reached until the user has carried out *self-evaluation*. This is an evaluation of the information skills applied during the process and the degree to which the application of those skills was successful or otherwise.

Many of the models do not mention 'evaluation' as a separate task, it is seen as implicit in the tasks which occur within the action stage of the process. Guthrie and Dreher call this stage *'recycling'*. At this point the user evaluates the information they have and makes decisions based on that evaluation. They may be in a position where the search can be closed or they may have to repeat the previous steps in the process [Yang, 1997]. Marchionini [1992] closes his model with *'extract desired information'*. Although not explicitly stated, this would indicate some form of evaluation in order to establish whether or not the information is desirable.

The act of closure can be explained from 'the user's perspective, as that small personal need to wrap up an experience.' [Westbrook, 1993 p.546]. This may be in the form of a formal presentation, report, essay, or answer sheet, but whatever the outcome, it is a vital stage in the process for the user, if that behaviour is to be repeated. Ellis identified *'ending'* as a separate stage in the process in his revised model but found little evidence to support this stage when studying physical and social scientist information-seeking behaviour [Ellis, Cox,

& Hall, 1993]. Many of the participants in this study continued searching for information even after a project was written up, although they did confess to being aware of the dangers of such an activity.

In the Kuhlthau model *'presentation'* is the closing stage of the process, where no further searching will be engaged in by the study participants. But the study did show, however, that 'many people may enter the presentation or writing phase without clearly, focused topics.'[Kuhlthau, 1991p369]. This would support the findings of Ellis, that quite often this stage is carried out without the search process reaching completion.

Although these models are represented as a linear process, it is important to mention that none of the researchers claim this to be the case. These studies offer differing perspectives on information-seeking behaviour in various environments and using subjects at various levels of information-handling sophistication. What all models have in common is the iterative, recursive and opportunistic nature of the process, which would seem to confirm the early work of Marchionini. Many emphasise that transition through these stages is an iterative process. However, only Marchionini [1996] has carried out specific studies into the transition through the stages. He identifies which stages are most likely to provoke recursive action and to where in the process they are most likely to lead back. Wilson [1999] has also adapted Ellis's framework to highlight the iterative nature of the process, particularly in the first five stages [p. 255].

Kuhlthau [1993] developed her model of the Information Seeking Process [ISP] beyond the stages of the process to include students' thoughts, feelings and activities related to the process. Four areas were identified; *Cognitive level: Thinking activities; Affective level: Feelings; Behavioural level: Actions* and *Moods.* Kulthau [1993] discovered that students moved from *ambiguity* in the initial stages of the process through to *specificity,* providing the search was successful. She also identified six stages of affective transition from *anxiety* at the beginning of a search, moving on to *optimism* as the topic was identified. This was often followed by *confusion, frustration* and *doubt* as the topic was explored in more detail. As a focus was formulated students began to develop a greater *interest* in the topic and gained *clarity* of thought, this was followed by *confidence* and finally the ISP ended with

satisfaction, relief or *disappointment.* Kulthau's research can contribute to the conceptual framework of this present study by providing additional signposts to inform the data collection and analysis.

The three Ellis models provide a behavioural perspective on information seeking by different groups of researchers in various contexts. Yang offers valuable insight into the process by classifying the differing categories of information-seeking behaviour and resources-related intervening variables in information behaviour. Although all of these models can contribute to the construction of a conceptual framework to inform this research study, the PLUS model devised by Herring [1996] has been selected as a primary tool for guiding both the data collection and analysis. This model was devised based on information skills teaching within schools and as such is specifically related to the young people in this study. Because it is a broad framework it also allows for emergent analysis and conforms to the principles of grounded theory. The breadth of scope within each category can provide signposts but does not *force* the data into strongly predefined categories. The phenomenological perspective offered by Kuhlthau, and the detailed account of the emotions and actions that accompany each stage in the process could prove valuable in determining the role of access to electronic information on the provision of learning opportunities.

4.2.2 The impact of individual approaches to learning on information behaviour

The following chapter discusses learning and approaches to learning in detail, but it is necessary here to introduce the potential impact of learning approaches to individual information behaviour. The models of information seeking discussed in the previous section are the result of primary research into the behaviour of various groups of individuals, in various situations. It is necessary to highlight that none claim to be definitive and that characteristics of the individual concerned will always influence behaviour through the information seeking experience. This present study focuses on learning opportunities in relation to information behaviour, as an individual's approach to learning will not only influence his/her information behaviour but also impact on the opportunities that exist within a situation. Limberg [1998] identified a relationship between an individual's learning style and the approach that individual took to information seeking. Depending upon whether

an individual was a surface, strategic, or deep learner, the approach to information seeking varied considerably. Those who were 'deep' learners sought out more information which allowed them to formulate their own opinions. Strategic learners wanted to locate sufficient information to make the 'right' choice, and surface learners concentrated on acquiring 'facts' which were 'easy' to find, understand and demanded the least effort. [Limberg, 1998] Approaches to learning will be discussed in more depth in Chapter 4 in an attempt to establish the role of EIRs in the provision of learning opportunities.

4.3 Information behaviour in the electronic environment

There has been considerable research activity into the electronic information environment during the past two decades. This research is cross disciplinary, concentrated mainly in the fields of library and information science; human-computer interaction; communication studies; social studies; psychology; computer science; and educational research. Although this review is focused on library and information science research, it draws upon work in other areas to complement and supplement the content.

4.3.1 Developing a conceptual framework.

The theoretical framework developed from this review incorporates the Wilson and Walsh 'general model of information behaviour' [Wilson & Walsh, 1996, p.37] and the Wilson model of information-seeking behaviour [Wilson, 1981]. The information seeking process of school children identified by Kuhlthau [1989, 1991] and transition through the process identified by Marchionini [1996] contribute to this framework. The Ellis and Haugan [1997] and Yang models [1997] will be used to guide data collection, providing the initial signposts for observation. The Information Skills model [PLUS] devised by Herring [1996] and supported by the Library Association will act as a structure for data collection and analysis. These models have provided a suitable framework to inform and direct this research, without prohibiting the emergence of issues which may not be present in this initial framework.

Many research designs have been used to study human interaction with electronic information systems, the limited success of system-driven models has led to the conclusion that;

> 'human behaviour and experience both adapts to and transforms social and technological context. Human activities motivate the creation of new tools, but these in turn alter activities, which in time motivates further tools.' [Carroll, 1997, p515]

If we are to study and understand these technological tools and the nature of our interaction with them, then no study can fail to consider human behaviour in its own individual, specific and diverse form. Information behaviour is subject to all of the individual idiosyncrasies that go to make up the human form and cannot be studied in isolation.

Figure 3.2 shows the theoretical framework, which was produced in order to carry out a study that encompasses the entire electronic information environments of the young people at the heart of the study. As with the research model discussed in Chapter 2, and in line with Solomon's 'notion of roundness' [Solomon 1998], this framework places those young people in their own, entire electronic information environment. This research focuses on the intervening variables, which relate to EIRs. Past research indicated that these were likely to include technical and organisational variables relating to the resource and social, cognitive and affective variables relating to the individual. These variables have the potential to become either negative barriers to the provision of learning opportunities or positive drivers.

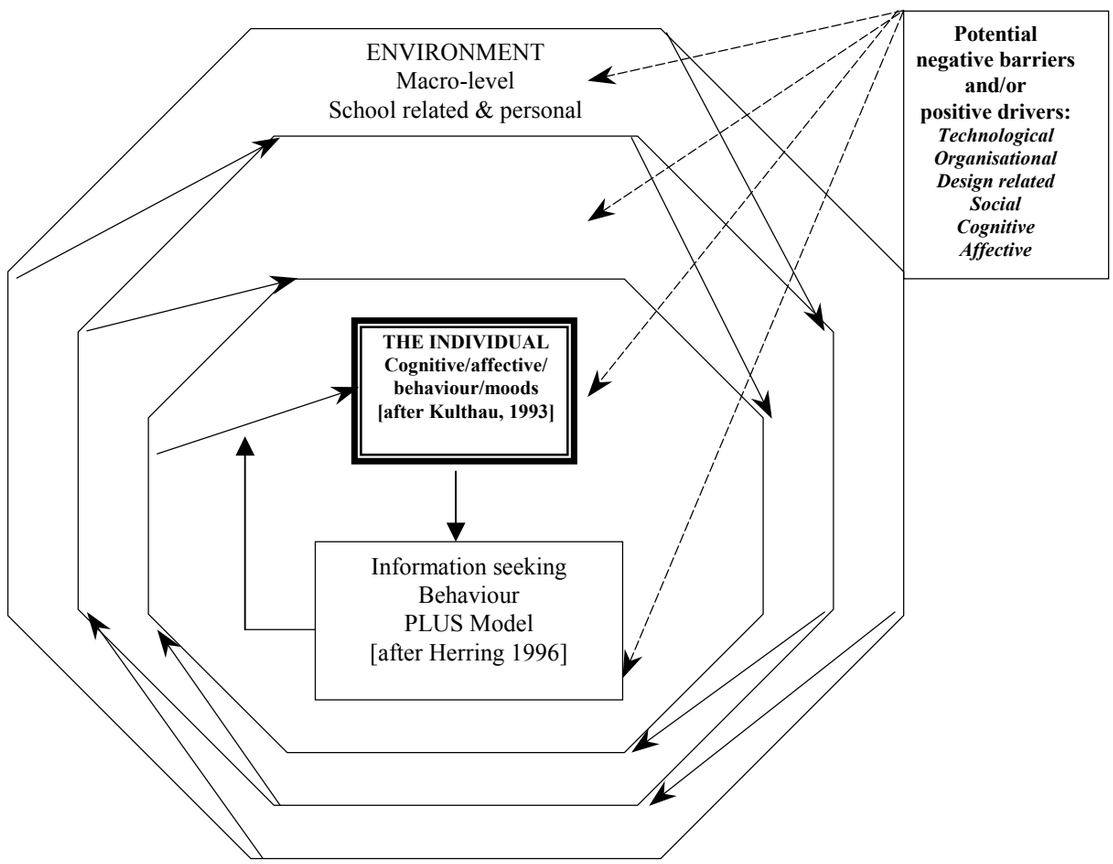

Figure 4-2 A conceptual framework for the observation of information behaviour in the electronic environment.

4.3.2 Applying information skills in the electronic environment.

Transferring information skills learned in the traditional information environment to the electronic environment is often regarded as a simple process. Research indicates that this is not always the case. Even where information skills training has been provided in one context, there appears to be some 'difficulty transferring them from the traditional to the electronic searching environment' [Chen, 1993, p37]. It could also be that the skills involved are different: 'Searching these electronic information sources requires a different set of search strategies and skills than searching print sources and appears to be related to the type of information that is desired' [Hirsh, 1997, p725].

Research has shown that users of EIRs can learn to carry out simple tasks within these resources after brief training on the use of individual resources [Siegfried, Bates & Wilde, 1993; Sievert & Glazier, 1990]. There is also evidence to suggest that they are not inclined to pursue this training, which they view as an added burden to the information search activity [Dutton, 1990; Martin & Nicholas, 1993]. This would indicate that 'people want to learn by doing, but this inclines them to jump around opportunistically in sometimes-brittle learning sequences' [Carroll, 1997, p.505]. Carroll also notes that studies show that one third of the time new users spend on electronic information systems is taken up by recovering errors. Skill level and training does influence the use of electronic information [Mynatt, 1992]. This training need becomes even more urgent to keep pace with technological developments. Electronic information systems have created an 'insatiable demand for training, particularly in IT and electronic information retrieval skills, both by LIS staff and users' [Day et al, 1996]. It is evident that training is required but there is also evidence to suggest that after initial introduction many users of these resources are reluctant to engage in further training.

Before interaction with retrieved text can take place, the user has first to understand and make use of the search capabilities of the information system. With specific reference to the Internet, Ward and Reisinger [2000] discuss the pitfalls of searching and group these pitfalls into two main categories, 'defects and inconsistencies in the searching tools, and the complexity of interpreting and evaluating results' [p 2]. Searching has proved to be a major problem within the electronic environment. 'Chief among students' problems in using EIRs

are generating search terms [and] designing effective search strategies' [Neuman, 1995 p297]. Chen, [1993] in a study of high school students' online catalogue searching behaviour, found that 'students had difficulty with the mechanical aspects of searching as well as with its conceptual components' [p37]. Designing effective search strategies and selecting appropriate search terms within EIRs has been identified as a problem for both adults and young people [Borgman et al, 1995]. Solomon [1993] found that young people had great difficulty in selecting terms relating to the subject of their search, even though they had selected the subject themselves. Ward and Reisinger [2000] have identified five main issues students encounter when searching the Internet; *students do not know where to start, search engines do not search the whole web* [and students are often unaware of this], *they do not know [or care] how to use an individual search engine's full searching syntax, search engines return irrelevant and multitudinous results,* and '*Spam'*[3] Although specific to the Internet some of these issues are also relevant to searching other forms of EIRs.

4.3.3 Navigating and browsing electronic information systems.

Browsing and navigating are terms which are often used interchangeably within the literature, McAleese [1989] argues that they are two very distinct activities and should be treated as such. He highlights the distinction; '…*browsing* is where an idea is followed using the linking mechanism of a hypertext element…*navigation* involves the use of a graphic aid such as a browser or map to show an overview representation of the nodes and links' [McAleese, 1989, p.7 emphasis added].

There is evidence to suggest that 'increasing sophistication of hypermedia creates higher expectations by information seekers' [Tobias, 1998 p.210]. Searching within hypertext systems researched with adult users has revealed problems relating to structure and form [Simpson & McKnight, 1990; Wright & Lickorish, 1990]. Navigation inefficiency has been identified as a major problem for users trying to move from one place to another in the electronic environment [Collis, 1991]. Neuman [1995] carried out research into student use of online and CD-ROM databases which revealed that users had considerable difficulty in 'overcoming mis-matches between personal ideas of how information is organised and how

[3] 'Spam' is the term used when web pages are loaded with keywords in meta tags which enables the page to be returned even when the page has no relevance to the search. A method developed to ensure maximum exposure of a page and one, which few students understand so they are left to struggle with associating that page to their topic.

information is actually organised in databases' [Neuman, 1995 p297]. Yang [1997] found that 'disorientation interfered with their learning by distracting them from their main tasks. It often leads to feelings of confusion, distraction, and frustration, and even powerlessness' [Yang, 1997, p88].

> 'All traditional text, whether in printed form or computer files, is sequential, meaning that there is a single linear sequence defining the order in which it is to be read….Hypertext is nonsequential; there is no single order in which the text is to be read.' [Nielsen, 1990. p.1]

Nielsen makes a distinction here between traditional text and hypertext that is common amongst system designers, however it could be argued that traditional text does not always fit so comfortably into this definition. Traditional text is not always designed to be read sequentially, texts are often prepared in such a way that the reader can enter that text at many, or indeed, any point. Many texts go so far as to invite the reader to refrain from reading the work sequentially. However, sequential reading of print based text is generally considered the norm and taught as such. Because of this, many users experience a great deal of difficulty in transferring information skills learnt in a print based environment to the electronic. As a consequence, and far from being a liberating factor, the nonsequential nature of hypertext brings with it a high level of stress [Pickard & Dixon, 2000]. EIRs exist in a three-dimensional space, end users have to develop their own frames of reference, remembering their 'physical' location within that space. It was Conklin [1987] who defined this phenomenon as the tendency to lose direction in a non-linear environment, to 'get lost in hyper-space.' As Shackel points out; 'what is so easily overlooked is that there must already be a consistent and recognizable structure for the reader to be able to jump around with confidence' [1997, p980]. In the study by Edwards and Hardman [1989] half of the participants claimed to have experienced feelings of disorientation during hypertext searching. There is a danger that creating hypertext documents can often become the primary focus and often their educational value can be lost in the creation of complex environments.

> '…merely linking documents has no major educational impact…Hypertext may also be ineffective if learners navigate through the knowledge base in an unmotivated and haphazard fashion…deciding the route through the material does not necessarily mean being involved in it…hypertext applications are not, therefor, necessarily cognitive tools…it is often difficult for learners to grasp the overall organisation of the material.' [Cesareni, 1994, p.159]

Yang's [1997] research shows that;

> 'Disorientation and cognitive overload are inherent in hypermedia environments…students, as novice learners, also ably demonstrated that after acquiring an initial familiarity with the content

> domain…they were deliberatively self-regulated in structuring their environment to reduce disorientation, cognitive overload, and reading and memory disruptions.' [Yang, 1997, p90]

In their study into online catalogue searching Borgman et al, [1995] identified the ideal information retrieval system for children would include, 'powerful searching mechanisms that build on children's natural tendencies to explore, and that can be used without prior training, and is within their range of skills and knowledge' [p681]. Research by Colbourn and Cockerton-Turner [1990] appears to support this with their findings that online help facilities, aimed at young users, work better when they are offered by the system in response to a typing error, rather than depending on the user to actively seek out help from the system.

Investigation of non-work use of the Internet has, so far, concentrated mainly on large-scale market surveys [Stevens, 1998], which examine demographic issues of use. There have been some exceptions to this. Nahl [1998] examined novice use of the Internet by carrying out ethnographies of individuals during the information seeking process that revealed issues of both a technical and cultural nature that need further investigation. This was supported by McCormick and Sutton [1998], who claim that there are many problems of both a technical and philosophical nature that need to be examined. Savolainen [1998] discovered that two of the major factors which hampered non-work use of the Internet were; the fragmented nature of networked resources and inefficient search engines.

User orientated research is gradually being recognised as a valuable method of discovery in areas concerned with system design, an area which has so far concentrated on expert evaluations in the form of cognitive walkthroughs and heuristic reviews [Shackel, 1997]. User observations, and in particular contextual inquiry, have only very recently been recognised for the valuable insight they can provide into user behaviour [Prasse, 2000]. 'The user's freedom, to browse, navigate and take part in a journey or voyage of discovery at will, is the most distinguishing feature of hypertext' [McAleese, 1989, p6]. But, as McAleese points out, 'freedom has its cost.' [p.6]. There is now the understanding that ' usability is the totality of what people do and experience, and that the diverse facets of usability are interdependent, and co-evolve with technology' [Carroll, 1997 p.515].

One aspect of research that is applicable to all forms of electronic information is that of human interaction with electronic text. In a relatively short period of time, Spring [1991,

p.iii] estimates 14 years, the manipulation of words has rapidly overtaken the manipulation of numbers in the world of computing. Technological advances now far exceed the level of cultural acceptance of electronic text and in order to narrow that gap users 'must appreciate its relevance, its potential advantages and more importantly, they must want to use electronic text' [Dillon, 1994, p.2]. Reading information on screen that has been retrieved from electronic resources has a significant impact on information behaviour. Research within Human Computer Interaction [HCI] has studied the speed with which electronic text can be read, a great deal of this points to reading from screens being notably slower than reading from paper sources. [Leventhal et al, 1993; Smith & Savory, 1989]. Shackel, [1997] claims that 'the major underlying HCI question here is how best to design usable electronic text' [p.980]. The majority of research in this area has carried out on adult users. There is evidence to suggest that observation of young people in these situations can contribute to this field [McKnight, *et al*, 1991]. Studies of information behaviour in the electronic environment have a contribution to make in understanding the impact of electronic text.

4.4 Potential positive driver and/or negative barriers to electronic information use.

The Wilson model of information-seeking behaviour [Wilson, 1981, 1994; Wilson & Walsh, 1996] identifies the barriers to information seeking as personal; social or role-related and environmental. This review and the nature of this present study do not allow for such rigorous distinctions to be made. Five areas of potential positive or negative impact have been identified but these cross boundaries between personal, social and environmental issues. These areas of potential impact are technological; organisational; social; cognitive and affective. Each of these areas transcend boundaries and can be related to one or more of the categories identified by Wilson and Walsh [1996].

Information literacy skills are taking on an ever more prominent role in an increasingly information intensive society. Information literacy skills become vital in a world where one 'of the major difficulties in using information technologies is the problem of information overload' [Connell & Franklin, 1994 p.611]. The universe of information has grown larger and more complex because of the extraordinary capabilities of new technologies. As a consequence students need more than ever the guidance of experienced and skilful teachers to learn to their full potential [Feldman, et al, 1999 p.5].

As context has only relatively recently been seen as a vital part of research into information behaviour, it is not surprising that there is little empirical research into the context of individual users. It is often the case that even when research has been carried out within a natural setting, little emphasis has been placed on reporting the contextual setting of the individual. There are a number of studies, which have focused on one or more of the possible barriers to information seeking. Burdick [1996]; Ford & Miller [1996]; Jacobson [1994] and Poston-Anderson & Edwards [1993] examined the impact of gender within the information-seeking process. There is evidence of gender differences in male and female computer use; Land [1999] found that males and females engage in different computer activities, and that young males spent more time playing games online and young females spent more time communicating through various forums. Leong and Hawamdeh [1999] found that the 'discrepancy can be attributed to the way computers are defined as male machines and computers software as a male domain by most parents.' Research does indicate that young females are much less enthusiastic when it comes to using computers, than their male colleagues [Martin, 1991, Todman & Dick, 1993]. Culley found that;

> ‘Computer rooms in most schools were regarded as male territory and girls report being made to feel very uncomfortable by attitudes and behaviour of boys. Some schools had recognised this problem and responded by establishing certain times as ‘girls only’.’ [Culley, 1988, p4]

Influences of social class and race on the process have been examined by researchers such as Martinez [1994] and Sutton [1993]. There is evidence that young people from poorer families, who do not have access to home computers, suffer in their acquisition of information skills in the electronic environment as a direct consequence of their economic status [Martinez, 1994]. Martinez also found that 'proficiency with information technology [was] strongly related to access to computers *outside* of school settings' [p.396]. He concluded from his research that 'information technology, especially computers, holds tremendous power to polarise society and in doing so to put different segments on unequal footing for participation in a democracy' [p.397]. Connell and Franklin [1994] found that the 'greatest barriers to the Internet are economic and geographic' [p.614].

Educational ability and behaviour does appear to be a factor in school use of computer based information systems, although this has more to do with teachers' attitudes than the individual. Arias [1990] carried out research into computer access and training in schools

which revealed that opportunities for extra curricula computer classes were only distributed to higher achieving students. In Cosden's study, secondary school teachers reported that they thought low achievers could benefit more from computer use than higher achievers, yet in practice these same teachers only allocated access to students with good basic skills [Cosden, 1988]. Clyde found that 'many of the limitations of the application of technology in the educational setting, or barriers to its effective use [were] human, administrative or legislative, rather than factors inherent in the technology itself' [Clyde, 1992, p.9]. It has also been discovered that 'novices often expect that information obtained from a computer will be more exhaustive and more accurate' than information obtained by other forms of searching' [Marchionni, 1996 p.15].

4.5 Summary

This review has highlighted the strong research base which already exists within library and information science and information use studies, a base that has provided this research with strong foundations and empirical evidence. It is evident that more research which focuses on contextual issues relating to individuals and their use of electronic information is needed to add to the growing body of research into information need, access, seeking and use. In accordance with use of prior research in a grounded theory approach, the research reviewed here has demonstrated its own *groundedness* in raw data and therefore its applicability to this study.

Yang [1997] calls for further research that aims to 'reveal a more complete picture' of the individual, considering 'the technological, cognitive, affective and social dimensions' of electronic information and the impact it has upon the learner. [p.92]. Wilson and Walsh [1996] found that

> 'the situation in which the information is found and processed appears to have been given less analysis and, perhaps particularly in respect of the role of computers in information-seeking, may be of some significance.' [p.37]

It is the intention of this study to analyse that situation along with the situation in which the need for information was initiated.

Carroll claims that 'computers can be deliberately designed to facilitate human activity and experience only when social and cognitive requirements drive the design process throughout' [Carroll, 1997, p516]. It is the intention of this research to contribute further

understanding of social and cognitive requirements, which appear to be of significance to the information behaviour of young people in their electronic information environment. The framework developed through this review will alert the researcher to possible avenues of exploration without constricting the natural flow of the research process.

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5 Learning opportunities in the electronic environment.

5.1 Introduction

> 'Learning is a change in human disposition or capability, which can be retained, and which is not simply ascribable to the process of growth.' [Lieberman, 1990,p.3]

The primary concern of this study is the role of EIRs in the provision of learning opportunities for young people. This chapter discusses what is meant by 'learning opportunities' and aims to establish the potential of EIRs, in affording such opportunities to the young people at the heart of this study. The discussion also focuses on research into how individuals approach their own learning and examines learning theory and the pedagogical approaches associated with those theories. From this discussion emerges a theory of potential learning opportunities in the electronic information environment. As 'access' is a key issue in this study, there is a brief discussion of the distribution of access and the criteria used in distribution. The philosophical underpinning of notions of equality need to be addressed in this debate.

5.2 Learning opportunities.

There is some indication from past research that access to EIRs, in its many forms from physical to intellectual access, does have a role in the affordance of learning opportunities. Affordance refers to the opportunities and results that are made possible by features inherent in the technology. This does not imply that the technology itself brings about these opportunities and results [Janassen, et al, 1994]. It is not possible for any technology alone to provide these opportunities. Human interaction with the technology is needed to achieve any perceived or actual affordance. James Gibson first introduced the theory of affordance in 1977 [Gibson, 1977 & 1979]. Gibson's theory of affordance states that 'the affordance of anything is a specific combination of the properties of its substances and its surfaces taken with reference to the animal' [Gibson, 1977 p45]. Here Gibson uses 'animal' to mean animals in general or a specific species of animal. An example of this from everyday activity is that of an object that rests on the ground and it is rigid and flat. If the surface of the object is raised and rests at approximately the height of the human knee, it then affords sitting on [Gibson, 1979]. Affordance describes the action possibilities presented by objects in the real world: 'There are many objects in our environment. Some we ignore, some we adapt to, and some we appropriate for our assertive will. It is the objects in this last category which fall

under the definition of *affordance*' [Ryder & Wilson, 1996]. Therefore, in the context of EIRs, an affordance becomes an opportunity for action perceived in the properties of the resource. Norman [1999] states that physical devices have both tangible and perceived affordances. The tangible affordance is the actual outcome or task completed using the device: The perceived affordances are the actions that the user sees can be done with the device. The concern here is with the action possibilities presented by EIRs to enhance any potential learning opportunities. Oliver [1995] found that '[a] number of studies have demonstrated significant achievement gains attributable to learning and information opportunities afforded by the implementation of IIS [Interactive Information Skills]' [p.188].

Learning opportunities are created by 'the manner in which we arrange the environment such that the child can reach higher or more abstract ground from which to reflect' [Bruner, 1985 p.24]. Wilson [1995] describes the minimum requirements for a learning environment as; 'the learner, and a setting or 'space' wherein the learner acts – using tools and devices, collecting and interpreting information, interacting perhaps with others' [p.26]. Research has shown that young peoples' learning occurs more rapidly when their interest engages them in both social and non-social interactions, when they are provided with opportunities to practice their skills, explore their environment and acquire new skills [Dunst, 2000]. Activities which allow students to 'practice, learn and explore are conditions promoting [students'] sense of mastery about their own capabilities and the actions and responses of people and objects' [Dunst, 2000 p.1]. The way in which learning environments are arranged is influenced by the theories which have been developed in an attempt to understand how, why and under what circumstances learning can occur. In order to proffer learning opportunities within a learning environment, it is necessary to understand how people approach a learning task. This would allow for opportunities to be presented in a way that corresponded to the individual's own preferred approach and are congruent with the learning theory in use. The following model has been designed to demonstrate the factors which influence and potentially create a learning opportunity.

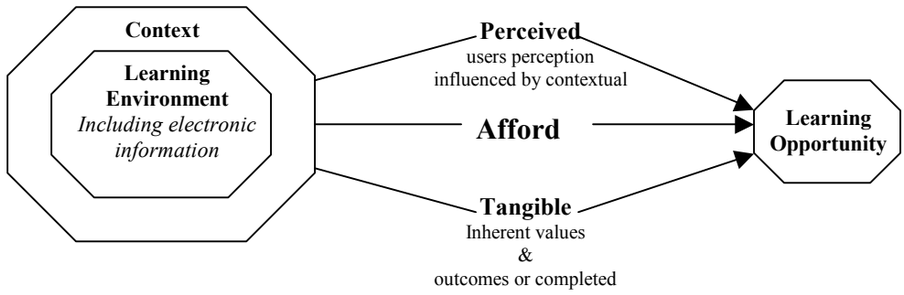

Figure 5-1 The provision of learning opportunities

5.3 Learning theories and pedagogical approaches.

The 20th Century has been primarily influenced by two distinct paradigms of thought concerning the learning process: behaviourism and cognitivism. These two paradigms have evolved into two distinct pedagogical forms. Behaviorism emphasizes observable, external behaviour, whilst thought processes and representation are the basics of cognitivism.

Tapscott [1998] makes the distinction between ‘broadcast learning’ and ‘interactive learning’. This provides a suitable distinction for the two forms of teaching which have developed as a product of the two paradigms of learning theory. Figure 4.2 illustrates the major distinctions between the two types of teaching and learning which have developed from these theories and are currently applied in educational settings. Becker [1999] found that teachers in schools are spread out across the continuum from 'traditional' [broadcast] to 'constructivist' [interactive]. The majority however see themselves as traditional with structured classrooms where they [the teacher] provided the majority of instruction.

Behaviourism / 'Broadcast'	Cognitivism / 'Interactive'
Learning is passive	Learning is active
Learner learns the correct response	Learners explore various possible responses and choose.
Learning requires external reward	Learning in itself becomes intrinsically rewarding
Knowledge means remembering	Knowledge means acquiring information and applying it
Understanding means seeing existing patterns	Understanding means constructing personal patterns
Application requires transfer of training	Application requires the learner to see relationships between problems
Teachers direct the learning process	Learners direct their own learning

Figure 5-2 Behaviourist and cognitivist teaching and learning principles

5.3.1 Behaviourism

Behaviourism is based on the concept of Classical and Operant Conditioning, that 'what is being noticed becomes a signal for what is being done' [Gutherie, 1959, p.186]. The behaviourist model of teaching and learning implies that an expert who has the information will broadcast that information to the student who will in turn assimilate that information into working memory. This form of teaching and learning is a combination of the Classical Conditioning of Pavlov [1927], and Skinner's Operant Conditioning [Skinner, 1987]. These theories reached the classroom in a somewhat diluted form. Classical Conditioning became drill and practice and Operant Conditioning became Gold Star Awards [Holt, 1983]. This approach to teaching centres on students' efforts to accumulate knowledge and the teacher's efforts to transmit that knowledge. As such it is teacher-directed and controlled, with the student taking on the passive role of information receiver. 'Learners are told about the world and are expected to replicate its content and structure in their thinking.' [Jonassen, 1991, p.28]. Von Glaserfeld [1995], describes teachers involved in this type of practice as 'mechanics of knowledge transfer', dispensing knowledge to passive recipients who have no control over their own learning. Hanley [1994] claims that this approach to teaching and learning does not provide suitable opportunities for 'student-initiated questions, independent thought or interaction between students. The goal of the learner is to regurgitate the accepted explanation or methodology expostulated by the teacher [p.3]. The assumption made by this approach to teaching is that all learners will acquire the same understanding of what is being transmitted [Jonassen, 1991].

5.3.2 Cognitivism

Cognitivism has its roots in the work of Dewey [1916], but it is Piaget who is generally seen as the driving force behind the cognitive approach to teaching and learning. Jean Piaget was a genetic epistomologist who studied human behaviour in relation to stages of development. His basic principle was one of *maturation* and *readiness*, stating that learning was only possible when the organism had reached a stage when it was ready to assimilate new knowledge into its cognitive structure [Piaget, 1955]. Piaget developed a model defining the four stages of development until *equilibrium* was reached, equilibrium being defined as adulthood. Piaget's work has been criticised for neglecting considerations of the social context [Crook, 1994].

The work of socio-cultural theorists, of which Vygotsky was the most prominent, emphasised the social dimension of development. They viewed development as not merely being influenced by social settings but being *grounded* in social settings [Vygotsky, 1978]. The social dimension of mental development was fundamental to Vygotsky's theory of learning and he placed individual consciousness as secondary [Wertsch, 1988]. Although Piaget put the child at the centre of his investigations he did not describe the role of interaction between child and adult in development. Piaget's views have more recently been described as 'essentially free-market and benign. All the information is available. You may help yourself and act for yourself' [Goodnow, 1990. p.277]. The learner acts alone and grows alone.

Vygotsky claimed that not only could a child assimilate new knowledge before it reached a state of readiness, but that in order to learn it had to be faced with knowledge beyond its state of readiness:

> 'instruction is good only when it proceeds ahead of development, when it awakens and arouses to life those functions that are in the process of maturing or in the zone of proximal development.' [Wertsch & Stone, 1988,p.165]

Vygotsky identified a *Zone of Proximal Development*, [ZPD], which was the difference, between 'actual development as determined by independent problem solving' and the 'higher level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' [Vygotsky, 1978, p.56]. Vygotsky believed that overall development began with external social activity and ended with internal individual activity. It has been a failure to conceptualise this relationship between

external and internal activity that has led to so many learning theories meeting dead ends [Luria, 1981]. A second major theme of Vygotsky's theory, and often referred to as the most significant, is that social interaction plays a fundamental role in the development of cognition. He states that;

> 'Every function in the child's cultural development appears twice: first, on a social level, and later, on the individual level; first, between people [interpsychological] and then inside the child [intrapsychological]. This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals.' [Vygotsky, 1978, p.57]

Vygotsky's ZPD, indicates that each stage of development does not have to be complete and internalised before the next stage can be accommodated. This brings into question Piaget's view of 'active self-discovery learning' being more productive than 'tutorial learning.' Psychologists working with Piaget in Geneva in order to test the benefits of active self-discovery learning carried out a series of experiments [Brainerd, 1984]. Evidence from these tests demonstrated that improvements from tutorial learning far outweighed those from self-discovery methods in earlier stages of development. This would appear to support Vygotsky's theory that tutor and peer interaction accelerate development through stages of learning and ultimately the learning process itself. This would indicate that learning is indeed socially grounded and although we may be born with a limited knowledge base, organisational ability, and internal predisposition, the social and cultural milieu has an enormous influence on how we develop that innate knowledge base. This is one of the primary distinctions between the theories of Piaget and Vygotsky. Piaget's theory of development explains a child's inability to handle new tasks and information as a lack of maturity in their internal structure. Vygotsky's work indicates that this inability is due to a lack of prior knowledge and experience and the consequent inability to make connections to existing knowledge.

Bruner also identified learning as an active process in which learners construct new ideas based on their current or past knowledge. The learner then selects and transforms information, constructs ideas and concepts and makes decisions based on those constructions [Bruner, 1966]. More recently Bruner has expanded his theory to include social and cultural learning [Bruner, 1990]. Bandura [1992] more closely examined these aspects in his theory of *self-efficacy* and *learned helplessness.* Self-efficacy is to do with a

person's belief in his / her own ability to control a situation. It is not a measure of skill but focuses on that which an individual believes he/she can accomplish at the present moment and in the future. Feelings of low self-efficacy can be traced to both educational and social background. Bandura examined the impact of repeated instances of failure on an individual's levels of personal self-esteem and confidence. He proposed that learned helplessness occurred when an individual experienced a series of demoralising events which resulted in the belief that they were powerless to alter the situation or to improve their own understanding of events. Levels of self-efficacy can impact on the opportunities an individual perceives to be present in a learning situation. Eastin and LaRose [2000] have examined levels of self-efficacy in relation to Internet searching and claim that 'Self-efficacy is essential to overcome the fear many novice users experience [p.2]. Their research showed that high levels of self-efficacy were achieved through prior experience with the learning resources and expected positive outcomes when using the resources. They identified the most powerful method of raising self-efficacy levels was 'enactive mastery', reflecting on successful past performance. 'Vicarious experience' also has the potential to raise self-efficacy levels but is most likely to produce a positive outcome when the vicarious experience is gained from observing a peer.

5.3.3 Constructivism.

> 'Constructivism asserts that the world is not found but made through interaction with experience. The learner acts as a theorist who continually refines his own structure of knowledge based on experience.' [Connell & Franklin, 1994, p.610]

Traditionally both cognitivism and behaviourism have denied any innate, domain-specific knowledge to the neonate [Piaget, 1971, Skinner, 1987]. Constructivism is based upon the presence of innate, domain specific knowledge within the neonate. Because this is a fundamental aspect of this approach to teaching and learning it is necessary to discuss what is meant by innate, domain specific knowledge.

A domain consists of a given set of principles, the entities to which they apply, and the rules that determine that application [Gelman, 1993]. Each domain is made up of micro-domains, for example pronoun acquisition is a micro-domain of the language domain as counting is a micro-domain of the mathematical domain [Karmillof-Smith, 1995]. Reference to the broad domains is all that will be necessary here and it is at this level that they will be discussed. Human beings, like all other species, are born with some degree of specific, innate

knowledge in each domain: 'Why would Nature have endowed every species except the human with some domain-specific predisposition?' [Karmillof-Smith, 1995. p.1]. The answer, according to Baillargeon [1986] and Spelke [1991], based upon their experiments with 6 to 8 month old babies, is that this is not the case. This innate, domain-specific knowledge has been described as no more than a skeletal framework on which subsequent learning builds [Gelman, 1993]. Individual domains are not stagnant, isolated entities. They grow and change through dynamic interaction with the environment in order to accommodate new learning [Carey, 1985]. That growth and change is attributable to many interacting processes. Piaget has been extensively criticised in recent years for his description of the purely 'sensori-motor' infant, endowed with no specific innate knowledge [Brainerd, 1984; Fodor, 1983; Spelke, 1991]. It has become clear that the domain independent, sensori-motor development identified by Piaget [1955], as processes of assimilation, accommodation and equilibration are not sufficient to explain domain-specific development such as language acquisition [Karmiloff-Smith, 1995 & Baillargeon, 1986]. This indicates that it is not purely through Piaget's processes of development that human beings learn. They, as other species, are born with innate knowledge upon which all subsequent learning builds.

> 'one can attribute various innate predisposition's to the human neonate without negating the role of the physical and sociocultural environments and without jeopardising the deep-seated conviction that we are creative, cognitively flexible, and capable of conscious reflection, novel invention, and occasional inordinate stupidity.' [Karmiloff-Smith, 1995, p.1]

Constructivist pedagogy relies on the presence of innate knowledge as the basis for all subsequent learning. This is possibly the major factor which distinguishes constructivist learning theory from cognitivist learning theory. The two other defining characteristics of constructivist pedagogy are knowledge construction and interaction with 'real-world' situations and other learners. The constructivist learner is seen as one who constructs his or her own reality, gaining new knowledge in relation to existing knowledge. Constructivist pedagogy is based on the axiom that a set body of knowledge does not exist outside of the learner's mind. Knowledge is constructed through the learner's attempts to solve complex problems and test this against existing knowledge and the understanding of others [Perkins, 1992]. Learning is seen as a never-ending learning process rather than the achievement of a learning goal as a product: 'Rather than behaviours or skills as a goal of instruction, concept development and deep understanding are the foci of constructivist pedagogy' [Fosnot, 1996, p.10]. Both content and context are important factors in learning and the learner must take

responsibility for his or her own learning [Franklin, 1989]. The constructivist view has significant similarities to models of the information seeking process. The processes involved in locating, selecting, retrieving and applying relevant information are themselves a valid framework for constructivist learning. Constructivism sees the learner as much more actively involved in a joint enterprise with the teacher in creating new understanding. Learning is a creative and active process, embedded in social experience as learners collaborate with each other to solve 'real' problems [Phillips, 1995].

One element of learning that is central to constructivist theory, and has no place in behaviourist or cognitive theory, is the view of teachers as learners, constantly expanding their own knowledge base by acquiring new knowledge as an integral part of the teaching process. This includes both subject specific knowledge and understanding of their own teaching practice. Driver [et. al.1994] discuss the role of the 'authority figure' [this generally refers to the teacher but could equally be the information specialist] as one that involves listening to learners and diagnosing the ways in which the instructional activities are functioning, in order to inform future practice. Ernest [1995] claims that the 'focus of concern with the teacher and in teacher education is not just with the teacher's knowledge of subject matter and diagnostic skills, but with the teacher's belief, conceptions, and personal theories about subject matter, teaching, and learning' [p.485].

Doolittle [1999] reviewed seven frameworks of constructivist pedagogies. From these frameworks he devised a series of eight factors which are paramount in a constructivist pedagogy.

1. Learning should take place in authentic and real-world environments.
2. Learning should involve social negotiation and mediation.
3. Content and skills should be made relevant to the learner.
4. Content and skills should be understood within the framework of the learner's prior knowledge.
5. Students should be encouraged to become self-regulatory, self-mediated, and self-aware.
6. Students should be assessed formatively, serving to inform future learning experiences.
7. Teachers serve primarily as guides and facilitators of learning, not instructors.
8. Teachers should provide for and encourage multiple perspectives and representations of content. [Doolittle, 1999, p5].

Constructivist teaching and learning creates an ideal forum to maximise the potential learning opportunities afforded by the electronic information environment. These eight factors provide an appropriate framework for examining the potential of EIRs in the affordance of learning opportunities to young people. All eight factors may be fundamental to constructivist pedagogy but what is not explicitly stated here is that equality of provision to the individual learner, in all eight areas, is also a fundamental factor. It may be possible to suggest that an additional factor may be equality of access, or that it underpins, and is fundamental to, all eight factors.

5.4 Approaches to learning.

> '[A] distinction is required between the 'hard-wiring' of an individual's style and the 'soft-wiring' of learning strategies [approaches] which make up an individual's learning repertoire.' [Rayner & Riding, 1997]

It should be recognised that individuals all have their own cognitive styles, which are described by general learning theories, but are specific to the individual and influence how they learn. Cognitive styles are characteristic to the individual and tend to remain fairly constant but they do not necessarily imply a particular approach to learning [Rayner & Riding, 1997]. Whilst there may be some fundamental ways of learning related to cognitive style, research has shown that most learners change their actual learning approach or behaviour in response to the context in which they find themselves. These approaches can be adopted as and when they are appropriate to the immediate goal.

Over a period of 5 years, Entwistle, Marton, Ramsden and Hounsell carried out a series of research projects into approaches to learning [Entwistle, 1983 & 1988, and Marton, Hounsell & Entwistle, 1984]. They identified three major approaches to learning by high school and university students labelled *surface, strategic* and *deep* approaches [see fig. 4.2]. All approaches involve a predominant motivation and intention, which contributes directly to the process engaged in by the learner. This process is also linked to the social and cultural environment, both past and present, surrounding the learner.

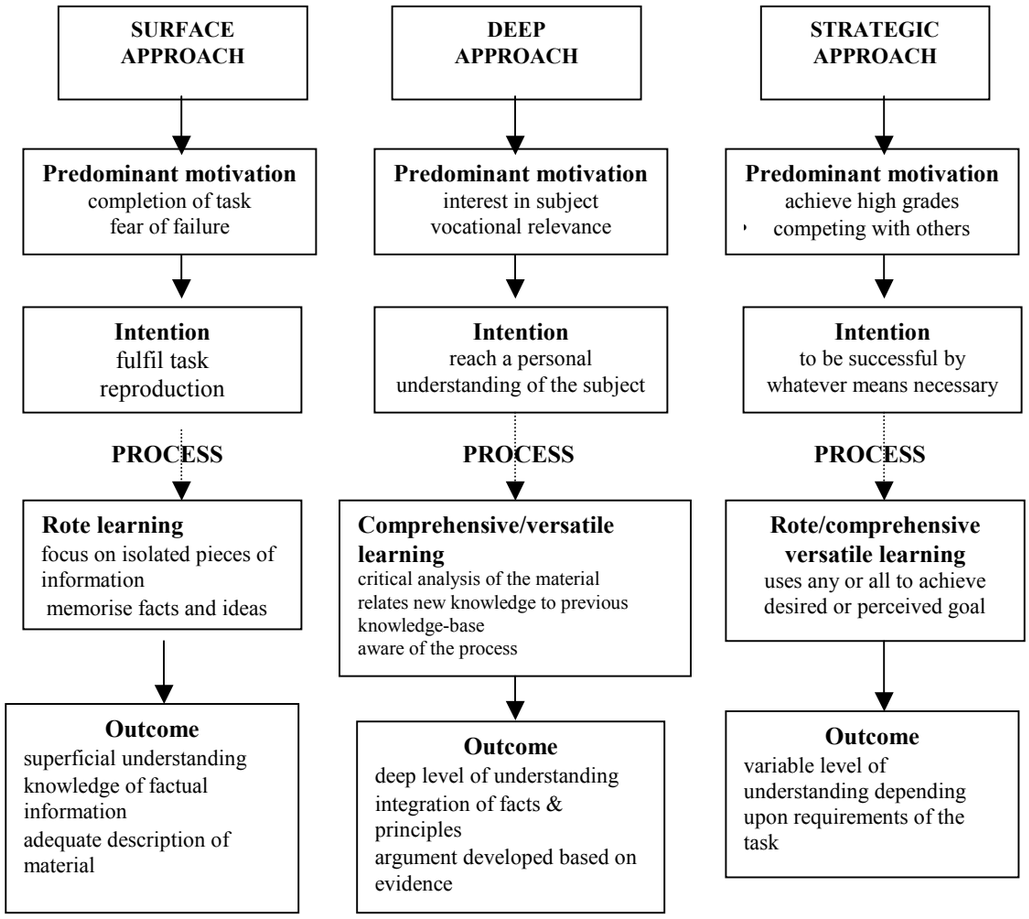

Figure 5-3 Approaches to learning [Entwistle, 1983 & 1988 and Marton, Hounsell & Entwistle, 1984]

This research has continued to be developed in recent years and this model of process has been used as the basis for much of that research. The surface approach to learning usually leads to information being atomised with no perception of the holistic structure of the content. Very often the learner will not be aware of any relationship between the atomised information and the whole. Learners fail to derive any deep meaning from the information and the outcome is usually a literal reproduction of parts of that information they have memorised or even wholesale reproduction. They have learned nothing about the process of gathering the information and have not been engaged in any meaningful interaction with the facts they have reproduced.

The deep approach tends to produce understanding of the communicative intent of the text or tutor as opposed to a reproduction of the actual text or language. This approach involves vigorous interaction with the subject and critical analysis of its content. It also involves relating new knowledge to previous knowledge and experience. A qualitative conception of the process and holistic organisation of the material often leads to an integration of ideas and a critical examination of the logic of the argument. Marton [1984] suggests that this approach may ultimately lead to self-actualisation contributing to the development of the individual as a whole.

Surface and deep approaches are now widely recognised amongst researchers and educational practitioners. Marton suggested that there was a need to identify a third approach, this strategic approach recognised as common amongst learners in a competitive situation, such as schools [Marton, 1988]. Students engaging in a strategic approach have to be competent in both other approaches and be capable of manipulating their approach to fit the reward system as they perceive it. It is a purely competitive approach that is aimed at achieving the highest reward (or grade) possible. Either surface or deep learning approaches may be used depending on the learner's perceptions of what will produce the outcome desired by the tutor. This is a similar approach to that which has been termed *cue-seeking*. Holt [1985] attributes this to the dominance of the right-answer culture, which forces learners into manipulating their own learning to accommodate the desires of somebody else: teachers, tutors or parents. This leads to 'answer-grabbing and teacher-pleasing taking continual precedence over thinking and understanding' [Meighan, 1995. p.5]. In summary, learning opportunities may be used and perceived differently by learners adapting and applying deep, surface or strategic approaches. The learning opportunities available may also influence the approach taken by the learner.

5.5 Learning in the electronic environment

The electronic information environment is a perfectly adequate vehicle for traditional 'broadcast' learning [Wishart & Blease, 1999] by offering the potential to transmit large quantities of information to the learner/receiver. EIRs proffered within a constructivist learning environment may afford learning opportunities more readily than within more conventional learning environments. Electronic resources offer learners different opportunities from the print-based counterparts [Brophy, 1993]. The 'new space' created by

the electronic environment allows the learner, the teacher, the problem to be solved and the knowledge needed to solve it, to converge in spaces that are no longer defined by boundaries of time and space [Tiffin & Rajasingham, 1995]. Community is no longer defined by physical location rather it becomes a product of shared information. Electronic environments can create communities defined by common interests which are uninhibited by geographical boundaries [Mitchell, 1995]. The electronic environment can also offer a non-threatening space, where learning from mistakes can play a vital role for any learner. Being able to take risks and try out ideas in a private space can encourage investigation and discovery [Anderson, 1990]. Accessing EIRs can remove some of the obstacles encountered in the more traditional spaces and allow discovery to take centre stage [Howard, 1993]. Students are no longer limited to information resources within their physical reach. Electronic resources have the potential to provide access to far richer choices and allow the student to conduct challenging investigations. Large, diverse collections of information can allow students, when encouraged, to evaluate the information they locate and cross-reference between sources [Ross, 1991]. The visual nature of electronic resources can often make complex ideas more accessible. For example when students see a difficult problem illustrated graphically it can often lead to a clearer understanding [Morgan, 1992]. Learning opportunities afforded by EIRs can be specifically associated with the eight principles governing constructivist pedagogy:

Factor 1: *Learning should take place in authentic and real-world environments.*

Constructisivm claims that all knowledge is context bound, thereby claiming that learning in the abstract is not beneficial without having a concrete framework on which to build. Doolittle [1999] argues that skills such as writing, reading and speaking are context independent but it is only when these skills are applied in more concrete contexts that they are internalised by the learner. Electronic information environments can provide access to 'a terrain or environment within which the learner may explore and navigate' [Wilson, 1995, p.26]. The Internet and many CD ROMs allow students to navigate through 'real-world' environments as well as associating those environments with their own personal interests and prior knowledge. Access to a wide range of information from a wide variety of sources provides authentic experience of information seeking and use. Skills acquired in the abstract can be applied within the electronic information environment to assist with internalisation.

Factor 2*: Learning should involve social negotiation and mediation.*

' For skills that are contextually bound to a social situation, then social negotiation and mediation would be effective' [Doolittle, 1999, p. 14]. Interpreting information located through EIRs often requires mediation. Establishing communication with both other learners and teachers in the same physical space could be encouraged and this could also extend to online relationships. Yakimovicz and Murphy [1995] found that asynchronous computer-mediated communication [CMC] could encourage a more critical, multi-perspective understanding. This involves similar skills to more conventional interaction, but provides additional levels of interaction and negotiation. CMC can allow communities of learners to work together on projects and offer mutual support and advice. Online communication can 'bring people together to challenge, support, or respond to each other' [Wilson & Lowry, 2000 p.3]. Leong and Hawamdeh [1999] found that social negotiation and collaboration in the form of group work played a vital role in the progress of gender equality in the use of electronic resources. Although they found that boys working alone or in 'all-boy' groups preferred not to enter into discussion whilst working on computers, working in mixed gender groups encouraged them to engage in debate.

Factor 3*: Content and skills should be made relevant to the learner.*

The Internet has the potential to 'encourage meaningful interactions with content' [Wilson & Lowry, 2000 p.3] which allows learners to develop their own information use skills and can often reward them with knowledge that they can apply in areas of personal interest. It is also clear to these individuals that these skills have relevance in the workplace and will enhance potential employment or educational choices.

Factor 4: *Content and skills should be understood within the framework of the learner's prior knowledge.*

'Meaningful learning is achieved when associations are made between new learning and old knowledge, a process known as elaboration…Students should not be expected to understand information for which they have insufficient prior knowledge or pre-requisite skills' [Doolittle, 1999, p.14]. It may be an advantage if students can also choose to use information that makes sense to them in relation to prior knowledge. EIRs offer information in a variety of forms, from the more traditional text based information to the more elaborate multi-media formats. Since there is a more diverse range of types of information

presentation, the individual has the opportunity to select a format that best suits their own experience and understanding.

Factor 5: *Students should be encouraged to become self-regulatory, self-mediated, and self-aware.*

These concepts are aspects of metacognition: ' [m]etacognition refers to one's awareness of one's own learning and thought processes, and the regulation of those processes.' [Doolittle, 1999 p.14] The electronic information environment offers opportunities for students to acquire the ability to monitor their own actions and behaviour and regulate that behaviour accordingly [Underwood & Underwood, 1996]. Access to ever increasing sources of information means that students have to act as mediators in respect of the information they gather and the process they engage in during the acquisition of that information. This wide variety of sources can be used in conjunction with relevant assignments to encourage students to explore multiple perspectives on individual issues and make informed choices concerning the validity of those perspectives. They may then be able to synthesize a comprehensive view on those issues. Meta-cognitive skills and awareness improve with the use of multi-dimensional environments and as this awareness increases it improves ability to work effectively in those environments [Hill & Hannafin, 1997].

Factor 6: *Students should be assessed formatively, serving to inform future learning experiences.*

'Formative assessment serves to provide meaningful feedback on the progress of learning…clarifies which learning strategies are being successful and the nature of one's current knowledge' [Doolittle, 1999 p.14]. Electronic information access could contribute to this in a number of ways. For example, online discussion with teachers could be used to monitor information use and feedback provided without formal assessment. Currently the information seeking process frequently receives little, if any, attention when it comes to the assessment of a piece of work. Students can only be expected to improve by having their information seeking behaviour examined, by both themselves and their teachers, and receiving feedback, can students be expected to improve. Collaboration with peers could also contribute to formative assessment, allowing students to share experience and provide each other with commentaries on the steps and processes involved. Students can be encouraged to assess their own information behaviour, constructing and reconstructing searches based on past experience.

Factor 7: *Teachers serve primarily as guides and facilitators of learning, not instructors.*
Within the electronic information environment teachers are very often engaged in their own learning process, so that learning could be a shared activity and could be used for mutual development. There are fewer opportunities for the traditional instructional role of the teacher in an area where teachers are still engaged in their own learning. A partnership of learning can be encouraged in this environment, as expectations of the guide or facilitator are not rigorous in terms of prior knowledge than that of the teacher. There is also evidence that students have the potential to become facilitators themselves to both their peers and their teachers [Hernwall, 1999]. The availability of EIRs can allow teachers to reduce their role as transmitters of information and increase their role as guides and facilitators.

Factor 8: *Teachers should provide for and encourage multiple perspectives and representations of content.*
'As individuals are exposed to information in different ways and from different perspectives, the individual builds increasingly more complex schemata and production sets [Doolittle, 1999, p.15]. The potential offered for multiple representations of content drawn from electronic information is far more diverse than that of the traditional information environment. Electronic information can be readily integrated into imaginatively produced work. The traditional methods of paper based assignments do not allow for the scope afforded by new technologies.

5.5.1 Equity of learning opportunities.

An investigation of the historical interpretation of the term 'equity' indicates that equity is that a complex issue dependent upon a number of often uncontrollable variables. The predominant concern of this study is with interpretations of equalisation in relation to learning opportunities and access to information. When examining any issues in which equality, or notions of equality, have a central role, the inevitable danger is the acceptance of common assumptions and value-dependent descriptions. It is necessary to define and make explicit these definitions within the context of the research [Foster, P. et. al., 1996].

Equality is the condition of being equal in quantity, amount, value, intensity and/or having equal dignity, rank or privileges with others.

Equalisation is the act or process of equalising, and the condition of being equalised where to equalise is to make equal in magnitude, number, intensity, condition, dignity, or power, or to bring to one level.

Equity is concerned with making fair and impartial decisions founded on moral justice. *Equitable* is fairness of actions and decisions taken, and arrangements made, with the emphasis on perceived justice to the individual.

The UK Government vision for a *'National Grid for Learning'* which is 'comprehensive, relevant, differentiated according to needs, and readily accessible…' [DfEE, 1997a p.6] appears to contain implicit acceptance of equal and equitable distribution.

Foster [1996, p. 44] claims that '[t]he term 'equality' has acquired a complex grammar', and goes on to say that this is partially due to the use of the term with reference to both descriptive and prescriptive equality. In its descriptive capacity, equality refers to quantitative descriptions of parity among groups. This is measured along some pre-determined index and found to be indistinguishable by reference to that index [Westen, 1990]. Measurements on equality are comparative and relational. To claim that something/someone is equal or unequal it has to be made clear with what they are being compared, and along what index that comparison is made. Equalisation in this sense would result in each individual being offered identical opportunity and access along some measurable index.

Prescriptive equality refers to ideas of justice and fairness. It is concerned with what ought to be treated in the same way [Secada, 1989]. The term used in research over the past decade in reference to prescriptive equality is 'equity' [Secada, 1989; Sutton, 1991. & Martinez, 1994]:

> 'Giving the same opportunities to everyone may be a form of equality, as would entering everybody, regardless of age and condition, in the same race. Equity demands a more subtle approach where opportunities, which are different, are resourced adequately and given the same status.' [McGinty & Fish, 1993, p.11]

Towards the end of the 1980s and throughout the 1990s, references to equality have been displaced by terms such as: 'benefits...distributed *equitably'* [Doctor, 1991. p.216] 'to provide *equity* for poor children with respect to their confidence.' [Sutton, 1991] *'equitable* access to information' [Martinez, 1994. p.395] *'Equity* in the classroom.' [Murphy & Gipps, 1996. Emphasis added]

In an educational setting, equitable opportunities rely upon distribution along some index of individual measurement based upon personal need or merit [Eysenck, 1991]. This is likely to involve unequal distribution of resources. It has been claimed that explicit distinction between quantitative equality and qualitative equality, or equity, would alleviate some of the paradoxical complexities of the concept [Foster, et. al. 1996]. Equality of opportunity cannot be defined simply in terms of access to educational resources. It can only be 'measured in terms of the effectiveness of those resources in equalising the overall pattern of results from unequal starting points' [Smith & Noble, 1995, p.18]. This then calls for more qualitative judgement on the level of access to those resources, an '*equitisation'* of access at individual level, within an overall system of *equalisation* of educational opportunity.

The rate of legislative change on education policy in the UK since the mid-1980s has been rapid. The earlier polices, pre 1980, within this legislation explicitly rejected the aim of equalising access to educational opportunities. They denounced it as a form of social engineering and 'effectively drew a thick line under previous developments' [Smith & Noble, 1995,p.19]. Along with this legislation came the emergence of a phenomenon which has been labelled 'equiphobia' [Myers, 1990]. Klien [1994] reveals the extent to which this had developed in education in her review of teacher training in Britain. She claimed that we 'no longer produce teachers who can be relied upon to ensure equal rights and implement equality of opportunity in schools' [p.175]. As student teachers they received no compulsory, formal training in ensuring equal rights in the classroom. She goes even further to state that, as a product of a market driven society, there is 'little reason to expect that issues of equality will be of general concern to today's student teachers [p.176]. Current Government initiatives on Life Long Learning and open access are attempting to redress the balance on these issues but it may take considerable time for these initiatives to impact in the classroom.

Equality is based on neutrality, treating each citizen as an absolute individual with equal opportunities [Gordon, 1996]. Equality used here in a descriptive capacity, would appear to be impossible, as it will always be diminished by structural inequalities such as: social class, gender, ethnicity, age and ability/disability. These structural inequalities can be categorised into physical and social inequalities, that is those endowed upon the individual by nature and those established, or at least authorised by the consent of society [Flew, 1980]. Any attempt

to neutralise these inequalities could be seen as a threat to personal equality or liberty. There is little doubt that equalisation of learning opportunities will constantly be disrupted by structural inequalities imposed by society and which society is, and possibly should be, powerless to neutralise. It is the non-structural, environmental differences that can, and should, be neutralised that are of prime concern to this research. Current Government initiatives are expressing concerns with these environmental differences and are attempting to address them [DfEE, 1997 & DfEE 1999]. For example inequality in social class and ability / disability. There cannot be a single, universal, identical and therefore equal method of surmounting barriers to learning opportunities. In fact such a universal solution would simply lead to a further consolidation of existing inequalities, bringing with it a high risk of polarisation between the disadvantaged and dispossessed underclass and the advantaged elite. Barriers to learning opportunities must be identified on an individual basis and solutions should be geared towards equity of learning opportunity for individuals within an environment where there should already be equality of educational opportunities. Within the electronic information environment, equity of access, at both the physical and intellectual levels, assumes an even more vital role when there is such a high dependence upon independent, individual access to learning opportunities.

5.5.2 Integration and change

There is potential for diverse application of new technologies in education. The constructivist approach to learning highlights some of that potential. First there must be motivation within the teaching profession to support and encourage the use of new technologies. Tapscott claims that the capabilities of educational technology are still not being realised due to a firm adherence to traditional broadcast methods of instruction [Tapscott, 1998]. Although the rhetoric of advocates of technology may suggest that technology itself can drive or cause change, research indicates that this is not the case [Carr, 1997]. 'Old habits die hard, however, and we should not expect new working relationships to be forged simply because a computer is on the workbench' [Underwood & Underwood, 1990 p. 165]. The school has proven to be a durable institution and it is unlikely that it will change drastically due to the introduction of new technology. Research has shown that school use of technology generally fits into pre-existing routines [Brown, 1994, Olsen, 1988, Papert, 1996]. Riffel and Levin [1997] found that 'it takes time for technology to be accommodated to existing practice, and even longer for existing practice to change so as to

take advantage of the new potential of the technology' [p.51]. Teachers, adults who are at best 'naturalised citizens' in the 'computer culture' [Turkle, 1995] often reinforce existing practices by fitting the technology into that practice. Educators express a sense of the potential of new technologies in education, but few have begun to explore that potential fully [Riffel & Levin 1997 p.51]. Phrases such as 'information superhighway' and 'home page' reflect a tendency to describe innovations in terms of familiar concepts, even when those terms fall short of accurate description [Bailey, 1996]. Often the student knows more than the teacher, learning teachers very often uncertain about how and when to offer assistance to students. Teachers frequently find themselves in unknown territory and this can lead to a sense of insecurity [Fisher, 1993]. Becker [1999] found that constructivist teachers allowed student use of technology three times more often than traditional teachers. He also found that the reasons teachers gave for holding to the traditional broadcast method of teaching was due to concern about state tests and standards which left little time to focus on more student-centred approaches to teaching and learning.

5.6 Summary

The constructivist approach to learning takes into account the learner's environment and ways in which he / she can interact with that environment. Regardless of the approach adopted by an individual to accomplish a given task, the provision of a greater number and a wider variety of choices can enrich this interaction. EIRs can enrich that environment and provide significant opportunities for learners to engage in more varied interactions with the information available to them. The provision of resources can be more extensive and can widen horizons and introduce new and challenging concepts, although this is clearly more demanding on the learner. The Internet can 'provide access to rich sources of information'[Wilson & Lowry, 2000 p.3] which may be personal or school related. Wilson [1995] describes a potential constructivist learning environment as 'a place where learners may work together and support each other as they use a variety of tools and information resources in their pursuit of learning goals and problem-solving activities' [p.27]. This description could as easily be applied to EIRs. Therefore the potential impact of access to these resources on learning opportunities needs to be investigated to determine the level and nature of that impact on the individual. Impact is also dependent upon the role of the teacher and the ways in which these resources are incorporated into the curriculum in order to maximise any potential benefit.

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6 Case Studies

6.1 Introduction

This research concentrates on sixteen single cases and the context of each case from the macro to the micro-environmental level, including the more remote aspects of that context [Layder, 1993].

> 'Case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances.' [Stake, 1995, p.xi]

The aim of these case studies is to provide rich pictures by using 'thick description' of both the people and their context as observed and interpreted by the researcher. These individual studies, within their contexts, provide the data for the cross-case analysis in the following chapter. Before looking at that analysis the reader needs to become familiar with the setting and the situation. The aim here is to provide sufficient detail for themes explored within the cross-case analysis to be transferred to other situations based on similarities between the reader's own context and the contexts of this research.

The presentation of these individual cases follows Layder's approach, placing each case within their wider context. Figure 6.1 illustrates the model used to present the findings of this research describing context, setting, situated and self. The macro-environment will be described in terms of national trends which will establish the wider context of the study. This is followed by descriptions of the four settings used in this study, the intermediate social organisation, which is the individual school and local library authority. Brief summaries of all sixteen case studies will be described within the description of each site. Full participant profiles can be found in Appendices 5 to 8.

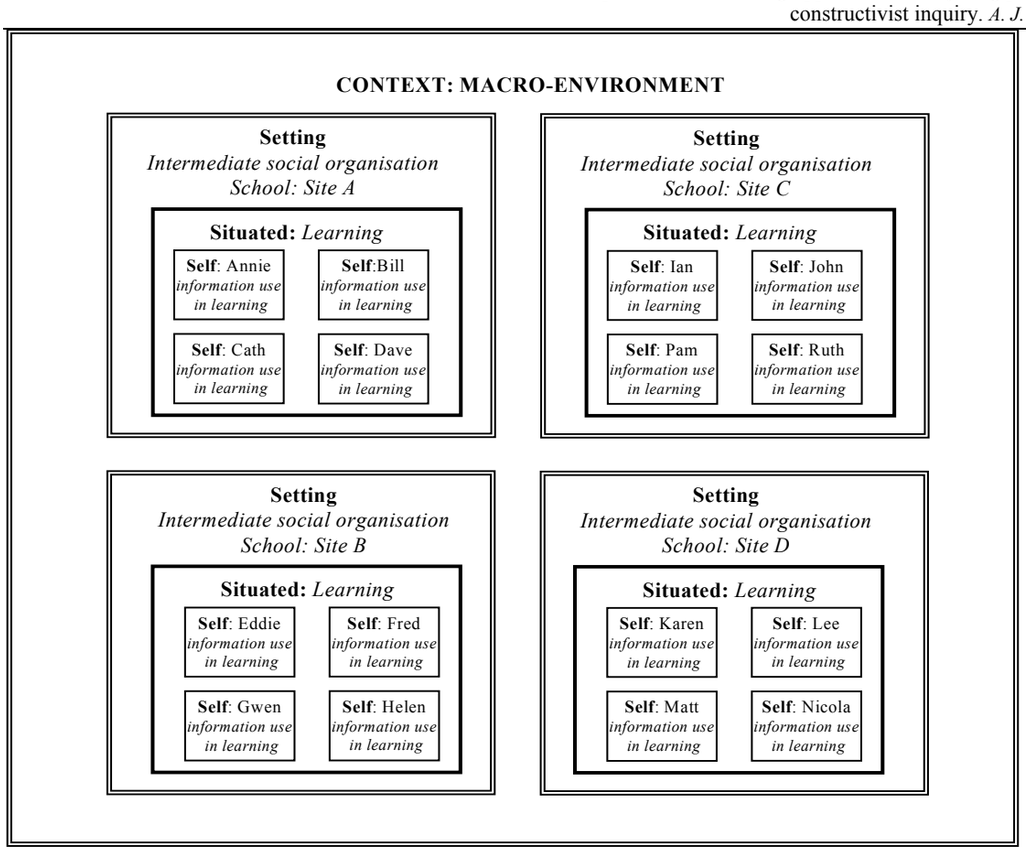

Figure 5.1 Presentation of findings [after Layder, 1993]

6.2 Current trends in electronic information use: The macro-environment

The macro-environment of the individual participants, who are the focus of this study, includes current trends in provision and use of EIRs at an international and national level. This includes Government and school policies and provision. There are many initiatives at both the school and national level, but actual provision does not always reflect policy. The Stevenson report recommended that Central Government needed to 'make the act of faith and encourage the education sector to start using technology rather than talking about it' [Stevenson, 1997, p.23].

6.2.1 International and national trends.

The UK Government has said that; ‘New opportunities are opening up as we see the potential of new technologies to change our lives for the better.’ [DfEE, 1997a p.3]. Information and communications technology [ICT] has taken on a high profile in current debates concerning education and learning both in and out of educational institutions. 'A world-wide discussion has been initiated about the function of computers in schools. It

emphasises not only the academic capabilities of the computer, but also its social, cultural and psychological impact within the school context' [Yaghi, 1996 p.137]. Kleiman [2000] questions whether or not the 'explosion of multimedia digital technology' can provide 'an adequate return on investment' and suggests that there is little evidence yet available to draw conclusions [p.1]. The National Curriculum Council [1990 p.23] stated that 'the past forty years have seen the information technology revolution. From a time when it was suggested that half a dozen computers would meet the entire information needs of the country, we have moved quickly to being a society in which computers are essential.' Schools are coming under increasing pressure to introduce ICT into and across the curriculum whilst demands by pupils and teachers are also increasing as a result of intensive advertising by commercial providers. In their consultation paper 'Connecting the learning society: The National Grid for Learning'[DfEE, 1997b], the Government have claimed that the new communication networks will, '[r]emove barriers to learning, ensuring opportunities for access for all' [p.3], creating a network that will provide 'equality of access for learners, whether at school, college, at home or in libraries' [p.14]. The *Grid* aims to link 'schools, colleges, universities, libraries, adult learning institutions, museums and galleries' [p.4] in a UK wide network as a manifesto commitment. It was claimed that the *Grid* would provide 'a national focus and agenda for harnessing new technologies to raise educational standards, and improve quality of life and Britain's international competitiveness… Stimulate public/private partnerships, bring together the best of private sector creativity and the highest standards of public service' [p3]. Dr Kim Howell stresses the increasing importance of ICTs within education, 'in the last twenty years, new technology has revolutionised the workplace. We must now ensure that our education system provides Britain's children with the tools they need as adults in tomorrow's economy and society.' [DfEE, 1997c, Forward] Although the rhetoric centres around ICTs in general, EIRs are an essential component of ICT provision. This indicates that provision of EIRs is currently a focal issue with Central Government, an area of ongoing debate relating to both the public and the private sector. However, Riffel and Levin [1997] claim that despite the initiatives discussed here 'recent education policy in Britain has given much less emphasis to technology than to vehicles such as examinations and inspection systems as a means of improving education' [p.60].

Recent announcements have indicated that the Government has identified lack of home access as a major barrier to any possible learning opportunities that can be provided by electronic information. A new initiative to provide recycled computers to over 2,000 poorer families in inner city areas has been announced at a cost of £15 million [Johnson, 1999].

The introduction of technology into education has long been a political issue, however Somekh [2000, p20] claims that these high political ambitions have never fulfilled the dream. 'The dream has been no less than the solution to fundamental, educational problems: How to individualise learning opportunities, to raise achievement for all to significantly higher levels, and to provide high quality mass education at a cost the country can afford.' This ambition is not unique to Britain, 'one of the seven priorities of the U.S. Department of Education is: ‘Every classroom will be connected to the Internet by the year 2000 and all students will be technologically literate.’ There is also evidence that Singapore is ‘pumping billions of pounds into the education system, so that by 2000 there will be one computer for every two children in classrooms across the country’ [Appleyard, 1997, p2].

6.2.2 School access

The Stevenson Report [1997, p.23] concluded that ‘the state of ICT in our schools is primitive and not improving. Much of the hardware is technologically behind the times.’ The introduction of new technologies into schools may have the potential to 'change our schools' but Conlon [2000 p.116] warns that ' technology without philosophy is blind. Unless it is harnessed to a clear vision of change then chip by chip, the technology could take us into a future that we would never willingly have chosen for ourselves.' The Government has attempted to provide just such a vision. In 1998 a guide to networking schools was published by the British Educational Communications and Technology agency [BECTa], outlining purchasing, planning and good practice in the use of ICT. [BECTa, 1998]. One of the targets established by this report was that 'by 2002 serving teachers should generally feel confident and be competent to teach using ICT within the curriculum.' [p.5] The Government vision of the ‘Networked School’ for the year 2002 [*see fig. 5.2*] outlined in this report is an ideal that would appear to be out of the reach of a great many UK secondary schools.

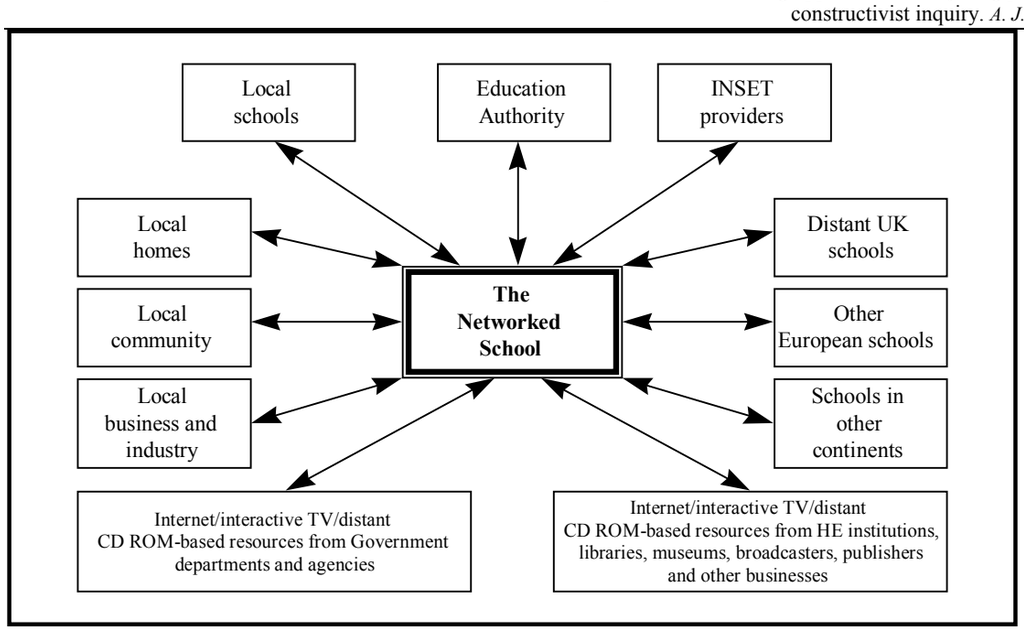

Figure 5.2 The networked school [BECTa 1998, p.7]

This publication was part of Government plans to have all schools connected to the 'National Grid for Learning' by the year 2002. However, by the time this guide became available many schools had already begun introducing ICT although there was little or no conformity of approach to this introduction. Without the benefit of heavily funded projects many schools were left behind in the 'network race'. The Education Departments *'Superhighway Initiative'* [EDSI] [DfEE, 1997b] involved over 1,000 schools taking part in 25 projects which did provide the level of funding necessary to set up examples of 'best practice' within participating institutions. The aim of the initiative 'was to look at ways in which schools and colleges might use the emerging information superhighway to contribute to learning' [p.7]. This initiative has provided valuable data on the benefits of ICT but major issues have been highlighted which impact on individual schools. The projects revealed that using commercially managed systems removed many of the more administrative problems but the basic cost of such a system for secondary schools is equivalent to four-and-a-half teachers' salaries [DfEE, 1997c]. This puts it far out of the range of the majority of secondary schools in the UK in the current economic climate.

There is very little uniformity in the provision of ICT in secondary schools across the UK. A national survey carried out by the Department for Education and Employment [DfEE, 1999] gives national averages but says very little about local provision of ICT in individual

schools. The survey, based on 1,452 secondary schools, gives the average secondary school pupils with an email address at 12%. The figure for teachers is 32%, although 93% do have access [in the narrow sense of *physical provision*] to the Internet. This report also identifies that only 39% of teachers have received updated training in the use of ICTs in the past two years. Provision of ICT in schools ranges from those schools that have reached saturation point in terms of pupil/computer ratios to those that provided almost no access to electronic information for the majority of pupils [DfEE, 1999]. This disparity of provision means that average figures can provide relatively little information concerning local conditions. Some of the barriers to the development of new technologies in schools have been identified as; 'cost of the available technology…resistance from those who feel that schools run in this way would not be fulfilling their duty of care in loco parentis and might fail to socialise young people to become good citizens of the future' and 'fixed assumptions and settled tradition' [Somekh, 2000, p.34]. Cost is an issue that appears in much of the debate on the introduction of new technologies, Sampson [1998 p.3] found that 'schools are accustomed to multiple years' use from infrastructure investment. Technology is notably different, characterised by accelerating advancements and change, industry push for obsolescence, and incompatibility of products… providing and sustaining professional development, technical support, and ongoing maintenance to make good use of technology required a far greater commitment than the initial capital costs.'

Teachers' perceptions of EIRs also have an impact on the use of these resources in school. There is evidence to suggest that 'attempts to introduce technological innovations into classrooms have a long history of failure' [Chalkey and Nicholas, 1998 p.97]. Russell and Bradley [1997 p.21] have identified one of the reasons for this failure as a lack of confidence. They found that 'between one-third and two-thirds of teachers who were not using computers were doing so because they lacked confidence with or felt frightened by computers.' This was supported by Guest and Alimi [2000, p.16], who found that '[t]echnical and maintenance skills were of particular concern to full-time class teachers with little ICT background.' The lack of research available on the impact of new technologies is one of the reasons identified by Cunningham and Andersson [1999] for teacher reluctance in embracing new technologies. They found that 'there will always be those who resist the new technologies, and they will be content to carry on working as they have done in the past until

someone shows them how they and their pupils might stand to gain from ICT' [p.21]. This is supported by McLaughlin [1998 p.1], who found that many teachers resisted change because they had 'not seen technology enhance student learning, may not know how to use technology effectively, or are not convinced that technology warrants all the attention it has received in the media as a potentially major contributor to student learning.'

6.2.3 Public library access

One large scale survey of all 138 public library authorities carried out at the University of Central England in Birmingham [UCE], has produced findings based on a response rate of 70.3% [98 public library authorities]. The survey was followed by case studies of eight authorities identified as examples of 'best practice' to provide more detailed information. [Denham, et.al., 1997]. This research has shown that 88.7% [86 authorities] of those responding to the survey offer EIRs to their users. The use of EIRs by children was restricted to varying degrees in all of the 86 authorities. Although 74% offered CD-ROMs to children, there was a fee of £1-3 per hour for this service.

> 'CD-ROMs provided for public use were largely those with an information or educational content although a few libraries provided fiction-based CD-ROMs. This meant that the number of CD-ROMs specifically aimed at children was limited.' [p.28]

This research found that only 19% of the 86 library authorities offering access to electronic resources provided Internet access for children, again there was a charge of £2-6 per hour for this service. 'Internet access for children was seen as particularly problematic by interviewees who expressed fears about the free availability of unsuitable information.' [p.28] The L.I.S.T.[1998] figures show that 36% of all UK public library authorities provide Internet access, The Denham report found that a relatively small proportion offered this access to children. The UCE survey also showed that, according to participant responses, 74% offered access to a library OPAC and 34% provided access to online community information free of charge. There was very little evidence of use of these resources by after school clubs or youth clubs and 'few authorities encouraged institutions to bring groups of children in to the libraries to use IT facilities' [p.29].

A second large-scale survey has discovered that only 8% of public library users who have access to EIRs make use of those resources in the library. The same survey also revealed that over half of the respondents had never used EIRs anywhere. [Coles, 1998]. This would

suggest that although the introduction of new technologies may well be increasing, the scale of society's acceptance of this technology is not increasing at a corresponding rate.

The public library sector has traditionally been a key player in the provision of learning opportunities to the community [DfEE, 1999 & Woodhouse 1998]. A project set up to examine open learning through the Internet in libraries has established that the public library environment provides a valuable point of access for the population [McCormick & Sutton, 1998]. It is evident from the survey by Coles that the majority of the population is not using this location as an access point. Offering Internet access in public libraries brings with it issues relating to training and user support. The resources needed for provision of this nature are rarely available in UK libraries. Although extensive training has recently taken place for library staff, it will take considerably more investment to allow this training to be passed on from them to the public.

Access to EIRs, particularly the Internet, in public libraries increased dramatically in the late 1990s. However this increase tended to focus on isolated pockets of activity such as the Croydon Libraries Internet Project [CLIP]. The publication of the Library and Information Commission report; 'New Library: The Peoples Network' [LIC, 1997], attempted to translate this localised activity into a national initiative and was followed by detailed plans on achieving this vision [LIC, 1998]. The UK Online Annual Report [2000] states that; 'by the end of 2002, all 43,000 of the UK's public libraries will be online'. Criddle and McNab [2000, p.42] point out that 'the Internet is impacting on all areas of the public library service'. They predict that libraries 'will be seen as access points to the internet, IT training organisations and mediators to a wealth of online information.' The role of the public library in the provision of access to EIRs is yet to be precisely defined, but there can be little doubt remaining that this role exists. Lilley and Usherwood [2000, p.91] conclude that 'the emphasis on providing a core and much-valued book based service, yet also delivering access to ICT services seems set to last, particularly as government initiatives in the lifelong learning area, delivered largely via ICT, continue to develop.'

6.2.4 Home access

In a large scale international survey, Reid [2000, p.1] has identified home ownership of a computer as a major area of concern for Internet access. He states that 'the key to future

growth involves breaking down barriers to access' and discovered that, although there may have been a dramatic rise in the number of homes which have access to a computer, '[m]any people can't afford the relatively large initial cost of owning a home computer — which is how most people access the Net today — and which is likely to be the main drag on Internet growth.' The survey also showed that less than half the households with a computer had access to the Internet.

Sarah Harris [1999] carried out research into the use of home computers by year 9 students. The results of this research indicated that the majority of children in this age group [68%] had access to a computer at home. This access was usually shared with other family members and the primary purposes were word-processing and playing games. Harris's research was focused in the South of England. Research by Livingston [1999] indicated that this was not a national trend. He discovered that only 12% of children in the UK aged between 6 and 17 had access to a home computer.

Access to computers in the home has risen dramatically over the past two decades. Access to EIRs is not however totally dependent upon the availability of a computer. New technologies are making it possible to access EIRs through digital television and there is evidence to suggest that this will significantly increase the number of individuals who can access a variety of resources without a computer [Tapscott, 1998]. This may well be the case, but at present access to EIRs at home by young people is still far from common place, as illustrated by Livingston's research. Recent Government initiatives to provide home computers would suggest that home access is an issue at both a national and international level. This concern is supported by research, which has indicated that home access is relevant in the provision of learning opportunities. 'School instruction in computer skills [is] important in gaining proficiency, but account[s] for less variation in computer competence than extracurricular access to computers, especially access at home' [Martinez, 1994, p.396].

6.3 Local environments

6.3.1 Site A

Site A was a 13-18 comprehensive high school situated in a semi-rural village in South Northumberland. The school serves the village, two towns and a number of smaller villages in the area. At the time of this research the school had 694 registered pupils; 68 were on the

special education register and 19 had special educational need statements. These pupils come from a variety of backgrounds, but there were only six pupils in the school from ethnic minority communities. At the beginning of this research the school was grant maintained but this status changed in September 1999.

During the first half of the fieldwork at this site the school library was closed to pupils and staff. Access to electronic resources was sparse, with only 10 machines available to access a few networked CD-ROMs and there was no access to the Internet. In September 1998 the new library was opened. This library was distinctive in that it was one of the few to be managed jointly by the school and the public library authority. The school spent £200,000 on resources during the refurbishing of the library. This included 12 computer workstations with full Internet access, CD-ROMs and a subscription to the Local Education Authority school library services giving access to 3,000 items each year, including both electronic and print material. Access is also available to the British Library through the public library service status provided by joint management. As well as the school population there were also 2,289 members of the general public registered as library users. As the commitment to the public library was branch status, opening times for the general public were restricted. Mainly the school used the first floor which housed the computer workstations and the ground floor of the library was mainly reserved for public access although pupils were not excluded. All technical services are computerised, including a stock catalogue, circulation control and booking system. The library has a page on the school Intranet that provides guides to using the resources, study skills tips, profiles of staff, borrowing instructions, a booking system for the computer workstations and the library policy. All teaching staff used the library and pupils were encouraged to make use of both the library space and the resources.

The school has appointed a chartered librarian, and the public library authority provided two library assistants. The librarian was a member of the school management team and had Head of Department status. The role of the library was clearly defined in policy documents and these were under revision at the end of the fieldwork. An 'Information Skills' training programme was about to be implemented as the fieldwork ended.

The Public Library Authority [PLA], which serviced this school, provided no access to electronic resources at the beginning of this study. This situation changed during the course of the study but the only location where these facilities were available was the branch situated at the school. None of the other libraries within this PLA provided access to any form of electronic resources. This included no access to an Online Public Access Catalogue [OPAC].

6.3.1.1 Participant summaries

The participants who were located at this site were Annie, Bill, Cath and Dave. Annie had access to many EIRs both at home and, as the study progressed, at school and the local public library. At the outset of the study she rarely, if ever, used the public library and did not access any form of electronic information resource from that location. This changed with the new system at the school. Both parents used the technology and were comfortable with it, allowing Annie regular access to the Internet from home. Annie had a very secure home background. As an only child, her parents admitted that she may be overindulged, which may have led to her having very high expectations, which could not always be met outside of the home often leading to frustration and anger. In the case of her attitude to school, she was highly critical of anything that did not match up to her ideal. She was a semi-skilled and frequent user of EIRs with a high level of physical access. EIRs were a motivating factor in Annie's learning environment. She was very interested in subjects which allow her to investigate and evaluate for herself, a process which seemed to encourage knowledge retention. Although she used electronic resources regularly and was confident in that use, she appeared to lack any clear understanding of the search process. A great deal of Annie's success with these resources had more to do with the amount of time she was prepared to spend on them than with any clearly structured search strategy.

Bill had access to some EIRs at home and at school. He never used any *outside* source such as the public library. His parents had no knowledge of new technologies and never attempted to use any of the resources they provided for him at home. His knowledge of the use of these resources was very limited although he did have a great deal of confidence in them and a high level of dependency on them. He never looked at any of the subjects or topics in any depth and always went for quick solutions rather than aiming for any in-depth understanding of the topic. Using electronic resources appeared to encourage this behaviour

in him as he could usually locate sufficient detail by using the *keyword* facility on Encarta. He only looked at the text surrounding the shaded keyword and never examined the section in any more detail. Bill was not a reader of printed material for pleasure or work at the beginning of the fieldwork. Even after becoming a member of the library in order to access the Internet this did not change. He was eager to learn as much as he could about the Internet and related issues but did not have the resources to satisfy this need. On many occasions during observations Bill took the opportunity to ask questions as well as answer them and was always willing to take advice when it came from someone he assumed was an expert. This was not the way he regarded his female peers in this research project. He could become quite defensive if they attempted to make suggestions to him concerning his use of the resources.

Cath had access to EIRs at home and at school. Her step-father was very IT literate although they spent little time together talking about this or working together. Cath was a high academic achiever. She appeared to be somewhat insecure at home at the time of this study, having only recently moved to the area and was apparently having some difficulty in settling down and adjusting to her new life. This did not appear to be having a particularly negative impact on her education as she was an above average student who consistently achieved high grades. Cath was a confident user of EIRs who was able to discriminate at a high cognitive level. She also had a high level of physical access to those resources. Cath was a highly motivated learner with sufficient confidence in her own ability to be able to identify when she has a need to develop further understanding or when a resource was not suited to her particular need. EIRs did not appear to impress Cath simply because they were electronic. She judged the functionality of the resource regardless of format. The lack of provision of training in the use of electronic resources was a cause of great frustration for Cath. She taught herself to use these resources but felt that a lack of formal training could have significant implications for the efficiency and effectiveness of her methods of use.

Dave had a very secure and supportive family. They did not have the financial means to provide access to EIRs from home, but did encourage Dave to learn as much as he could from school. Dave was a very pro-active citizen who was involved with local politics and had a very clear sense of his role in the community. Before the new system was introduced

in school Dave had very high expectations of the Internet and electronic resources in general. He did not have access to any of these resources outside of school and looked on the new systems as his opportunity to experience and become familiar with the new technologies he was constantly hearing about from friends, family and the media. When he did get access to these resources his initial response was one of enthusiasm and pleasure and he was sure that it would be of great benefit to him academically. This enthusiasm was short lived as he became frustrated by his lack of ability and dependence on friends. He was also aware that not having home access was a clear disadvantage and he could not see any possible change in this situation in the near future.

6.3.2 Site B.

Site B was a City Technical College catering for students from 9 to 19 years from over eighty primary schools in two major cities. Although the catchment area was predominantly urban many of the students did travel from a number of small villages in the surrounding area.

The school had a very strong Christian ethos. A plaque on the main entrance dedicates the building and the school to 'God'. This Christian discipline is maintained throughout the school, and parents were made aware of this on application.

Discipline in the school was a priority. The emphasis was on teacher directed learning in all subjects and students were rarely given the opportunity to articulate their own views. This did influence the way participants from this school responded in initial interviews. It was difficult for them to adjust to the idea that they were being asked to voice opinions as well as describe events.

The library occupied a central location in the school and was available to staff and students from 8am to 6pm with staff on hand to offer guidance during these times. The book stock was comprehensive, although access to electronic resources was limited. Computer access was extensive throughout the school yet the library only had access to one networked computer and one stand alone computer used for the school OPAC. There were computers in all subject departments which were regularly used in the teaching curriculum. There was also an 'open IT area' which was used by individual students and for class bookings. This area was adjacent to the technicians' room so assistance was always on hand and students

were encouraged to seek help. There was access to 12 networked computers in this area and students were encouraged to use them for researching school projects. Many of the observations were carried out in the IT open area.

There was seating for 52 students in the library and individual students used this before school, after school, and during break periods. Class sessions were timetabled throughout the week for both subject based research and information skills training. Information skills training began in year 7, with regular refresher courses for each year group. Collection management was done in collaboration with the heads of each subject department and reviewed on a yearly basis. The Librarian was a member of the support team committee and attended all management meetings, maintaining a high profile in the school. Internet access was only available to staff and students were not encouraged to access the Internet for any school-related research.

The PLA, which serviced the catchment area of this school, offered extensive access to EIRs from the Central Library. There was access to an in-house OPAC and this was also available via the Internet. There was limited provision of these resources from the other service points within the area so, unless the participant had access to the Central Library, it would not be possible for them to make use of all of the facilities on offer.

6.3.2.1 Participant summaries

The four participants from this site where Eddie, Fred, Gwen and Helen. Eddie was selected first in order to contrast with the male participants from site A. He was a very private and serious person who came from a very supportive family background providing a very high standard of school related resources for use by the two children in the family. Both parents were highly IT literate and able to provide instruction and guidance on the use of EIRs. His parents had high expectations of him but they were also prepared to help in any way they could, and showed an active interest in both his schoolwork and his hobbies. Eddie had extensive access to EIRs and was highly competent in using them. He had a deep understanding of the nature of information and could distinguish between 'opinion' and 'fact'. He took a very pragmatic approach to learning, with very firm goals and would organise his learning in order to attain those goals. He was a very content and confident person who worked hard whilst retaining a balance between schoolwork and recreation.

Fred was an enthusiastic student who worked hard in order to maintain his relatively high standard of work. He had no access to electronic resources at home although he did make use of access provided at school and at the public library. His father encouraged and supported him to do well but was unable to offer any guidance in relation to electronic information use. Fred had just managed to fit in well in his new school and make a new set of friends. He appeared to enjoy school and was able to make good use of his time there. Fred had a great deal of confidence in his ability to use electronic resources but the evidence from observation did not always support this. However, the researcher had noted that he was shy and this could have made him very nervous in the early stages of the research. His lack of understanding relating to Internet searching did not appear to improve as the research progressed although he had, by this time, opened up to the researcher. There was evidence to suggest that Fred was only confident on the surface. He often relied heavily on others to confirm and support his findings and was never particularly self-reliant. He preferred to work in groups when carrying out independent research because he felt he needed the support of others. He would always confirm his findings with other students even when the work had been set as an individual task. If his results differed in any way from those of his friends, he would always suggest that he was wrong. Fred had very little confidence in his own ability when it actually came to making his work public.

Gwen enjoyed school very much. She was not a high achiever but this did not taint her opinion of school. She spent much of her time with her Grandparents as her mother worked full time and was a single parent. Gwen did not have access to EIRs at home but did have access at her Grandparents house. She rarely visited the public library and never used electronic resources there. Although access to these resources was available at school, she avoided them as much as possible and never visited the school library for independent research. She enjoyed being with her friends and she enjoyed being part of the school. Her commitment to the school was evident in the way she contributed wherever she could. She worked hard to stay on the various sporting teams and volunteered for extra curricula activities. She had a very active social life and placed great emphasis on having close friends around her. Her confidence in herself was easily shaken and Gwen would often avoid anything that involved taking a risk. She rarely tried anything new, and even when she did it

was only with the support of a friend. She was very conscious of 'getting it wrong' and was not prepared to trust her own judgement.

Helen had a very secure home background. She was a confident and happy young woman who did not have any strong feelings about her education or learning in general. She had access to electronic resources at home and at school but did not appear to place any great significance on this. The computer was just there, like the television or the CD player. She did not have any preconceived expectations concerning electronic information, having not thought about it in any detail at all. The home computer had been a Christmas present for both Helen and her sister but it had not occurred to Helen that it could make significant impact on her schoolwork. She enjoyed having access to electronic information and was aware that not everyone had the same privilege but she tended to use school computers for schoolwork and her own for recreation. Helen did not have any real career plans at this stage and she often appeared to be disinterested in school. However, she was very keen to do well but was very unsure about the contribution electronic information could make to this and was therefore rather disinterested.

6.3.3 Site C.

Site C was a 13-18 comprehensive high school situated in a suburban area of North Tyneside. The school serves the town in which it is located along with other towns and a number of smaller villages. At the time of this research the school had 823 registered pupils. 33 were on the special education register and 16 had special educational need statements. The pupils were from a variety of backgrounds, although ethnic minority communities were under-represented. This school was one of the sites in the government 'Super Highway Initiative' [DfEE, 1998b] and received special project funding as a part of this.

The school library is housed in a central area known as the 'Pyramid' because of its striking design, a pyramid roofing structure of glass. Although this looked attractive it was a cause of discomfort to many of the pupils. Many of the glass panels leaked and the light shining through made it difficult to work at many of the computer workstations in the area. The space in this room is divided between a large area containing 20 computers and a small area for book stock. The 'technician' in charge of the library has an area beside the doorway, which also accommodates the photocopier and the printers. The 'technician' is a qualified

information professional. However, at the time of this research her job title was 'technician' and she was on a Clerical and Administration pay scale. Her status in the school was not recognised as professional and her job description consisted mainly of technical duties in relation to maintaining the equipment both in the library and throughout the school. The book stock was low and there was very little borrowing. The school did not subscribe to any school library service and relied upon their own stock purchasing. This appeared inadequate for the 13-18 age range the school served. There was no information skills training and there was no catalogue available for users in either print or electronic form. A small selection of CD-ROMs were available in the library but there was no list of titles and access was difficult. Internet access was available through all of the computer workstations in the library although access was restricted through the Local Authority server. When use of this server began students found they were restricted from many of the sites they had previously had access to. This included a blanket ban on access to 'Chat Rooms', a move that considerably reduced the use of the Internet by many students.

The PLA provided access to CD-ROM databases from the Central Library but not from any of the satellite service points. There was no online access to the library catalogue either within the public library or via the Internet.

6.3.3.1 Participant summaries

The four participants chosen from this location were Ian, John, Ruth and Pam. The location itself provided an interesting setting in relation to the developments that were currently underway and these four young people provided an opportunity to observe these developments over time. Ian had access to EIRs at school and in his public library, but had no home access. His parents were very supportive. At the time of this study his mother had returned to Higher Education and the family had purchased a computer for word processing. His knowledge of the use of electronic resources was limited and he was aware of this, always eager to seek guidance from his friends. Ian did not like to spend a great deal of time on school projects or homework, doing 'just enough' to complete the required task and no more. Using electronic resources encouraged him to investigate further on many occasions but this only happened when the research was concerned with one of his hobbies. Ian was a regular public library user with good library skills, but he never used printed material from the school library because he said it was too badly organised to find anything there at all. Ian

was very keen to understand new technologies and was well aware that he still had much to learn. He was very willing to experiment and frequently sought help from his friends.

John was driven by a personal interest in new technologies and he was encouraged by his parents to pursue this interest. John had a very close family and a secure home background. He had access to a vast assortment of EIRs but he had worked very hard to build this collection. He had purchased the bulk of his hardware himself using money saved from doing odd jobs and his paper round. Access to electronic resources was a motivating factor in John's learning environment and he was prepared to dedicate much of his own time to increasing his knowledge of new technologies and then applying this knowledge to other areas of study. John had a very clear understanding of the use and application of these resources. He had been unwilling to use any other form of information at the outset of this research but he did change his attitude as his knowledge of non-electronic resources increased. He was able to make informed choices concerning the appropriateness of the resource to the need. Much of John's success with electronic resources came from independent learning and extra tuition. He claimed that everything worthwhile that he had learnt concerning electronic resources had been learnt outside of school. John was the most technically competent participant in this study.

Pam had a very mature outlook. Her family were emotionally supportive but did not encourage her academically. She lived with her mother and sister, visiting her father and his second wife every other weekend. She did not have access to EIRs at home but she wanted to own a computer more than anything else. However, she was well aware that there was little possibility of that in her current situation. She did not complain about this and said that as long as she had access somewhere then it was not a problem. She stayed behind after school every evening to work in the Pyramid. Sometimes she would go in chat rooms as well as conducting school-related research. She used the public library to borrow fiction but did not access EIRs from that location. EIRs encouraged Pam to carry out research that she would not have attempted before. Although she was an avid reader of fiction, she did not enjoy book research. Her use of chat rooms had improved her skills at navigation in the digital environment and given her confidence in her ability to learn.

Ruth came from a very secure home background. She had access to many EIRs at home as well as at school, and was encouraged to use them in a thoughtful way. There was limited knowledge of the resources at home and this tended to lead to a more restricted approach to access. Ruth used resources in a very pragmatic way, depending upon the subject she was researching but she felt very unsure in the electronic environment unless she was researching 'facts'. She did use these resources frequently but in a very limited way. Ruth preferred to study subjects with definite right and wrong answers, feeling very insecure when she was asked about her own ideas. During this research it took her a long time to accept the fact that it was 'her' that was of interest to the research and that there were no 'right and wrong' answers, only her perception. This was a difficult obstacle to overcome in this case.

6.3.4 Site D.

Site D was a 13-18 high school with 1398 students at the time of the fieldwork with 13 students having educational statements and a sixth form of 481. A very high proportion of students elect to remain at the school on 'A' level courses. In 1998, 220 out of 300 year 11 students decided to remain at the school and move on to sixth form. The level of attainment at the school was higher than the national average in English, Maths and Science. This high school was situated in a large rural town and the school serviced both the town it was in and a neighbouring town as well as a number of surrounding villages and isolated farms and homes.

The library had a well-established policy on information skills training which began in year 9 with 'enquiry skills' and was encouraged through the school. Each teaching department supported this policy and there were strong lines of communication between the library and the teaching staff. The school had a qualified information professional in post at the beginning of the research, and an assistant who was working towards qualification part time. During the fieldwork the librarian went on maternity leave and the assistant was in charge of the day to day running of the library with a department head brought in to assist.

The library had a book stock slightly below the national average but the stock was well managed. The ratio of computers to students was also below the national average but the resources available well managed to ensure that access was fair. There was access to the

Internet from one computer in the library, which was booked in advance by students, and there was a large selection of CD-ROMs. Some of these were on the school network whereas others had to be collected from the librarian and loaded on to one of four computers in the central space. There was only one printer available and this was connected to the one computer that could be used for Internet access. Pupils and teachers frequently had problems accessing the Internet. The connection often went down and they would often experience difficulties reconnecting. The Internet password changed every 2 hours as a way of regulating access, but because of this the technician had to keep ringing the service provider to get the new password. The library was very open and light, with a great deal of activity, and people seemed to be going about their work in a very industrious manner. A security system had been installed with tagging and a detector at the door. The library had an automated circulation system and an OPAC. The local PLA did not provide any access to EIRs of any type.

6.3.4.1 Participant summaries.

The four participants from this location were Karen, Lee, Matt and Nicola. Karen came from a very secure home background with very supportive parents who had high aspirations for her. They were prepared to support her in any way necessary and her school life always came first. She had access to many information resources from home, both printed and electronic, so she did not have any dependence on school or public library provision. She also preferred to access these resources from home as she lived a considerable distance from both school and the local library and home access was therefore the most convenient option.. She could not stay behind after school because she relied on the school bus for transport. Her parents were familiar with new technologies and were able to offer her support and guidance from home. Karen was a highly motivated student, but she was motivated by her own ambitions and did not consider school to be anything other than an obstacle to be surmounted in order to attain her goals. She was very aware of popular images of EIRs but they did not influence her. She evaluated resources on the value they held for her and she was not prepared to spend vast amounts of her time becoming familiar with the use of these resources. Email had been available to her for some time but until she saw some real value in using the resource she was not prepared to devote time to familiarising herself with it.

Lee enjoyed school. He had lots of friends and although he was not a high achiever he took his learning seriously and knew it was important to work hard. He was very interested in technology but did not have access to EIRs from home. He had been asking for a new computer for some time but had accepted that it was financially impossible for his family. He did have access at a friend's house and spent any free time he had using his friend's computer. He did not have any career plans at this stage but he was very interested in technology. Lee had a lot of responsibility at home and was aware that sometimes he missed out on opportunities at school because of this. There was no evidence of any bitterness, he just tried to make up for it in other ways. Lee had a lot of confidence in his technical ability. Sometimes this was not always demonstrated and on these occasions he was inclined to blame the technology when things went wrong. He was very reluctant to seek the advice of adults but regularly sought help from his friends.

Matt was a confident and outgoing young man who had the support and encouragement of a close family unit. He was an active member of sports and drama clubs. Matt was very focused and had a very clear picture of where he wanted to go in life and what he wanted to do. He approached his responsibilities in an organised and positive manner and managed his time exceptionally well. He enjoyed both the social and academic aspects of school and he was very keen to take advantage of all that was available to him. Matt did not have a computer at home. Although he did want one, he knew that his parents could not afford to buy one and he admitted that it was not essential and he could live without it although he would prefer not to. Matt was highly motivated and he did not appear to need encouragement to try new things and get involved with groups that interested him. Working with EIRs had encouraged Matt to spend more time on his academic projects than he would have chosen to do in other circumstances. He had become very familiar with the technology through access at school and at the home of a friend.

Nicola was part of a large family unit. She had a good relationship with her sisters and, although she did not spend much time with them, she also got on well with her brothers. She had access to EIRs at school but did not have access at home. She used the public library to borrow fiction material and to do homework using the word processing facilities. The public library charged for this service so she was not able to use it often, only on those occasions when her sisters paid for her to hire time on the computer. Nicola was not highly motivated

academically. She wanted to do well but had decided that she was not very 'bright' and did not feel it was within her power to change this. She frequently failed to hand work in on time and made no attempt to make excuses for this. She had resigned herself to a career as a shop assistant. Although she did not want this, she thought that anything else was beyond her capabilities. Nicola enjoyed using EIRs but found the Internet was too ambiguous. She could not cope with the responsibility of having to make choices and evaluate for herself.

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7 Cross-case analysis

7.1 Introduction

Klobas [1995] claims that 'electronic resources have characteristics of both information sources and information technology,' and that 'use of electronic resources can be explained by a combination of factors included in information use studies and technology use studies.'[p. 97] This research has identified four major groups of variables which determine the impact that access to EIRs can have on learning opportunities for the individual: Technological and organisational variables which relate to the physical components necessary to interact with EIRs. Cognitive variables relate to knowledge of the resources, and perception of the processes involved. This is followed by the ability to apply this knowledge and perception to the use of individual EIRs. Affective variables which are concerned with the individual's feelings and emotions about, and attitudes towards, the use of the resources, the information, the location, and the purpose of their own searching behaviour. Social variables, which are primarily concerned with economic factors, images of electronic information, peer interaction and gender issues.

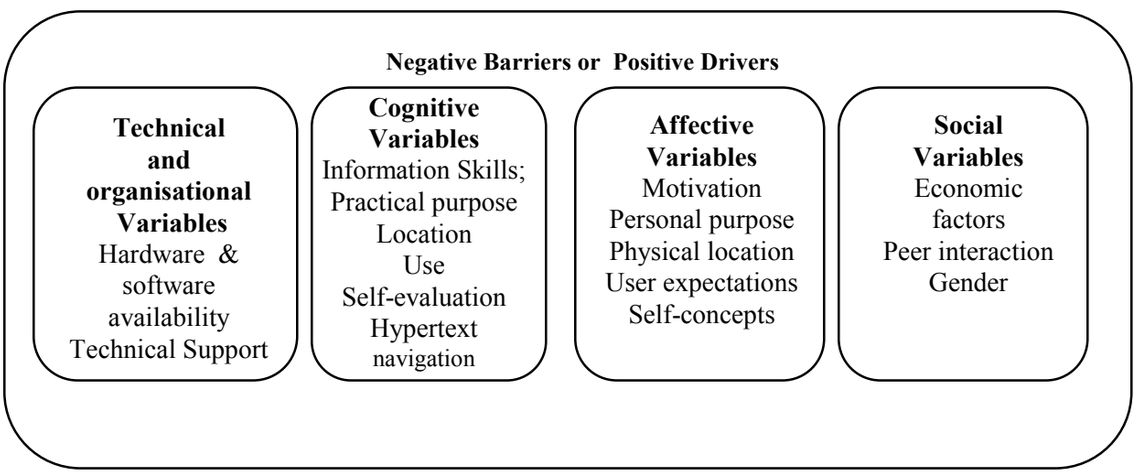

Figure 7-1 Variables impacting on user interaction with electronic information

7.2 Technical and organisational variables

The impact of EIRs on learning opportunities is initially dependent upon the level of physical access to the hardware and software necessary to interact with the specific resource. Having physical access not only includes the availability of hardware and software, it also relates to the user having the skills to use these resources and an appropriate level of

technical support. The technological variables identified by this research as an influence on interaction with electronic information were *hardware and software availability* and *technical support*.

7.2.1 Hardware and software availability

All of the young people in this study had physical access to some computer hardware and software, but there was little consistency in the level of physical access. There was evidence of vast disparity in availability in the home, in the public library, and within and between individual schools.

7.2.1.1 Research findings.

The young people in this study had very different levels of physical access to computer hardware in their own local libraries. Some had no access at all whilst others were members of a library which has been nationally acclaimed for the public electronic information service they offered. Access to computer hardware in the home was not available to all of the young people in this study and there was considerable variation in the type of hardware owned or used privately.

Physical provision of computer hardware varied considerably across the four schools in this study. All four schools had an 'IT' room used only for timetabled lessons with access denied at all other times, even when the rooms were not in use. All four schools had computer hardware in the library or learning resource centre, figure 6.1 shows the number work stations physically present in each school available on an apparent 'open access' policy.

	School 1		**School 2**	**School 3**	**School 4**
	1997	**1998**			
Library / Learning resource centre	**1**	**12**	**1**	**20**	**5**
Open access IT area			**14**		

Figure 7-2 Number of workstations available in each school.

These figures show that computer hardware was available within each school but access is dependent upon more than the physical presence of hardware.

The young people in this study had their own perception of levels of availability, and it was their perception that was the focus of inquiry;

- Regular maintenance of the equipment;

RQ: *DO YOU GET MUCH CHANCE TO USE IT AT SCHOOL?*
Annie/I1: *Not really, somebody's is always on it or it's broken.*

RQ: *DO YOU USE COMPUTERS FOR YOUR OWN WORK AT SCHOOL?*
Dave/I1: *There's the ones in A4 but we can only go on them in IT, there's one in the library here that's the only one we've got and it's been out of use, somebody said it was broken, I don't know what was broken but we couldn't use it.*

RQ: *DO YOU GET MUCH CHANCE TO USE THE COMPUTERS AT SCHOOL?*
Eddie/I1: *It's okay in the IT Open Area but the one in the library, well the network keeps going down, you book a time on it and then when you get there the network is down and you might as well just go straight home and use your own .*

Observations testified to the reality of this situation and both library and teaching staff confirmed that they found it difficult to keep up with maintenance issues. Technical support was limited in all schools. Two had dedicated technical support staff for ICT but open access IT areas were regarded as low priority. The remaining two school relied upon the single school technician for all IT and ICT support.

- Quality of the hardware and software;

RQ: *SO WHERE DID YOU DO THAT WORK?*
Annie/I1: *Mainly at home, because you couldn't really do much at school if you needed the computers, and the computers are black and white printers instead of being colour.*
Annie/I1: *I prefer it at home because you can learn to do things by yourself and it's like easier to use, normally the stuff at home is a lot better than it is at school.*
RQ: *WHAT DO YOU MEAN BY BETTER?*
Annie/I1: *You can get more stuff, and normally the quality of things is better, because like colour cartridges, and you can get upgrades of Microsoft and stuff like that and normally at school you don't have that.*

RQ: *DO YOU EVER USE IT AT SCHOOL?*
Bill/I1: *Well there's only a couple of computers what's got CD ROM's, there's one over there and we've just got some new computers that's got Encarta on, I just prefer to use it at home.*

RQ: *SO WHERE DO YOU PREFER TO DO THAT WORK?*
Fred/I1: *In the library, you know the central library near my house, they've got much better stuff than the school has, they've got the latest Windows stuff, I do it all in there because I like using the most newest stuff.*

RQ: *SO WHERE DO YOU USUALLY DO THAT WORK?*
John/I1: *At home, the system here is too slow I think it needs updating but I don't suppose they will because it would cost too much.*

Karen/I1: *I usually use it at home, you can us it at school but you have to book it in advance and you can't go on the Internet unless you've got the Internet on the machine your using, its much easier to do it at home.*

One of the schools in this study improved the quality of both the hardware and software during the fieldwork but some participants still regarded this as inferior to the quality available at home.

- Cost of use.

RQ: *DO YOU USE THE INTERNET IN THE NEW LIBRARY NOW?*
Cath/I2: *No, you have to pay £2 for half an hour from 4 o'clock and I can use it for nothing at home so why pay? Anyway I don't see why we should have to pay when it's for school stuff it's not fair.*

RQ: *DO YOU USE THE INTERNET IN THE LIBRARY?*
Dave/I2: *Well I did at first, but now you have to pay £2 for half an hour after 4 o'clock and I can't so I don't bother going on now… Anyway, after 4 o'clock you have to pay to use the computers and I cannot afford it, I spent all my paper round money one week but I'm not doing that again. It was when we first got the new computers and everyone wanted to use them, it's not worth using all your money.*

Ian/I2: *You have to buy extra print credits if you use up your allowance and that means you have to be really careful about how much you print off. I suppose it makes sense really but it's not very fair if you haven't got any money.*

RQ: *SO HOW DO YOU GET TO USE THE COMPUTERS IN THERE?*
Nicola/I2: *You've got to book and you've got to pay. You have to pay to use the computers in the public library, I went on once when my sister paid for me but that's all. My sister usually does that.*
RQ: *SO WHAT CAN YOU DO ON THOSE COMPUTERS?*
Nicola/I2: *Well its just mostly the same that you do in school but more detailed.*
RQ: *CAN YOU GET ON THE INTERNET THERE?*
Nicola/I2: *I haven't tried because that would probably cost more so I never asked.*
RQ: *YOU HAVEN'T TRIED, DOES IT HAVE CD-ROMs?*
Nicola/I2: *Yeah.*
RQ: *YEAH, WHICH ONES?*
Nicola/I2: *I don't know, I haven't used any there for the same reason. Probably they would cost more and my sister wouldn't pay for that I've just went on the word processor.*

Pam/I2: *I spent more time making a fancy cover, the school charges now for prints, for colour prints if you haven't got permission and the teachers don't give permission because it means its 50p off their budget, so I had to pay 50p to do the front cover for my course work.*

Charging for access was common practice by public library authorities and schools, this varied between authorities from free access to computers but charging for print outs to charges for both access and printing facilities.

- Distance from home.

Dave/I2: *I stay after school sometimes but I have to get the school bus home and if I miss it I have to wait ages for the other bus.*

Karen/I1: *I can't really stay after school because I need to get the school bus home so its just in breaks and stuff. Its not really that easy.*

Pam/I2: *I have to get the bus home and if I stay too long I miss the only one that takes me to the door, that's the one my Mam says I have to get so I just leave in time for that one.*

This was an issue in all of the schools for those who did not live within walking distance, it was also an issue when ICT facilities provided by the public library authorities were only available at one location, predominantly the central library.

- Prioritising individual use.

Bill/I2: *They've got favourites, usually sixth formers and them that did the training thing in Year 9. They got picked to try out the new school network and now they get on all of the time. I suppose it's because they know how to use it so they don't keep bothering the Librarian and that.*

Dave/I2: *I got asked to give up my computer because they said I wasn't doing school work, I was but I couldn't find anything so I was on for ages, they didn't believe me so I just got off and I don't bother that much now. It's free at lunch time so I try to get in then but you can't always get a computer, they're very busy*

and sixth formers get priority. You can hardly ever get on the computers at lunch time because the sixth formers get priority and they use them all the time.

Nicola/I2: *I come in here, the school library sometimes but you can never get on a computer. They started a booking system last term but that's just faded off now, it's first come first served now.*

Pam/I1: *It's the same people in here every night, I think they book up weeks in advance or something. You're supposed to get priority if your doing homework but they just lie and get on anyway.*

This issue was particular to schools. Public library access was controlled by booking systems however there was evidence to suggest that adult library members were given priority and young people were only allowed access when supervised by an adult. Teachers and librarians in all locations admitted that the systems in use were not always 'fair' but they could not see a solution to this problem that would satisfy all parties. All schools gave priority to sixth form use and although there was evidence to support this action there was no attempt made to explain this to other pupils in the schools.

7.2.1.2 Discussion of findings.

Recent Government initiatives in the UK [BECTa 1998, DfEE, 1997a, 1997b, 1998], have led to a rapid increase in the number of computers in schools. By 2002 it is hoped that all schools in the UK will be connected to the National Grid for Learning. This, and the falling price of personal hardware, will see an increase in the availability of computer hardware and software. However there is considerable evidence to suggest that it is still relatively easy for some young people to reach the end of compulsory education with very little knowledge of, or familiarity with, electronic resources.

Hardware availability in school is dependent on a number of issues relating to the emphasis placed on the resource by management, availability of funding and technical expertise available within the location. Although policies on the provision of these resources did exist in individual institutions there was little consistency across authorities and very often policies within individual institutions were not followed.

Although physical access may be available, very often it was at a cost. This caused frustration to the participants in this study. Those who did not have access at home were very often the same people who could ill afford to pay the cost of access in the school or in the public library. Connell and Franklin [1994] claim that 'the greatest barriers to the Internet are economic and geographic.' They go on to say that it 'is not just overcoming the

inability to pay for access but also the inability to afford the necessary computer equipment and training to use it.' [p.614] Schools and the public library may well be in the best position to overcome these barriers but this research indicates that these barriers still inhibit access.

There appeared to be very little evidence to support claims made in school policies concerning open access to computers. Very often which students could use computers was left to the discretion of individual members of school staff and they often allocate access based on their own level of experience of the technology and personal knowledge of individual students.

The location and availability of hardware does not give any real indication of the level of access available to individuals. Having high computer - student ratios is not sufficient evidence to claim high levels of physical access. This research would indicate that there is still considerable work to be done if the Government vision of a National Grid that is 'comprehensive, relevant, differentiated according to needs, and readily accessible' [DfEE, 1997a, p.6] is to be achieved by 2002. There appears to be little evidence to suggest that availability of computers outside of the home is sufficient to create this high degree of accessibility. The latest Government initiative appears to have identified this need for home access amongst the poorer sectors of the community by seeking to make computers available in the home at an affordable rate, to over 2,000 families. This still would not address the issue of telephone charges for online activity.

7.2.2 Technical support

The technical support available to the young people in the study included personal support from members of their families, members of school staff, public library staff, peer support, online help facilities, and occasionally, printed manuals. Although there was some evidence of training in relation to use of hardware, the primary concern of those in the study was software training. The hardware can often cause technical problems but that was of less significance to this group than the software.

7.2.2.1 Research findings.

- Personal support.

The young people in this study were a great deal more willing to enlist the assistance of their peers when they are confronted with an unknown situation providing the opportunities to do so was offered to them;

Bill/I1: *I didn't have a clue when I got me computer, but me friend down the street, he's a couple a years older than me, he's got it, he just showed me how to use the computer and stuff like that, and I went from there really.*

RQ: *SO DO YOU OFTEN GET ASKED FOR HELP FROM YOUR FRIENDS?*
Annie/I2: *At school and at home, from my friends on how to use it. When they are here I show them how to use it so they know how to use it at home or school or whatever and then people who are online sometimes ask how to use things and where to find things.*
RQ: *HOW DO YOU FEEL ABOUT THIS?*
Annie/I2: *I like it because I know how to use it. I feel like the teachers should show them more because they ask really easy things. Like things like where do I type the web address, its boring because its easy stuff but I still enjoy showing them.*

This study suggests that interaction with peers offers training at an appropriate level;

Lee/I1 *My mate has got a computer at home so he knows what he's doing, I usually ask him because he can explain it better than the teachers. They use words I don't understand and they get mad if you can't take it all in.*

Matt/I1 *There's a whole gang of us who go around to each others houses and we try stuff out together, that way we each can learn from the others, one of us is bound to know the answer so the more of us there the quicker we figure things out.*

Bill/I2 *They say its just one person to each machine in the library so its harder to work stuff out, it's better if you can sit with one of your mates, that way you help each other out.*

John/I1 *People usually ask me stuff but we get wrong if there is more than one person to each machine in here* [the school library]*, so I can't always help them. We tell the technicians what we are doing but they just say we are messing around and we have to go and sit at separate machines. That doesn't bother us really because now we just email each other with the questions and answers but that takes a lot longer. It's pretty hard to explain what to do in words all of the time, its easier to show people.*

The young people in this study were often very wary of one to one support which was offered by 'experts', they were anxious not to appear foolish, when Karen was asked about requesting support from library staff she said;

Karen/I1: *I find out stuff about my own interests and stuff but if I didn't have that computer at home I probably wouldn't know how to do half of the things, I don't really want to ask either because I feel stupid.*

RQ: *IT IS VERY DIFFICULT TO GET ADVICE OR SUPPORT WHEN USING THESE RESOURCES IN SCHOOL?*
Matt/I2: *Yes, you're never sure if you're asking the right question and I feel like an idiot if it turns out to be something really simple. The technician doesn't like it if you ask really easy questions, he thinks it's a waste of time.*

When assistance was requested from technical support staff it was common practice in all schools for the technician to carry out the task on behalf of the student rather than explaining how the process worked;

RQ: *OKAY, EXPLAIN WHAT HAPPENED, DO YOU ALL GO IN AS A CLASS?*
Dave/I1: *Yeah, well it was a normal IT lesson, everyone's in at the computers, and then he would like say, right a couple of people go to the computers at a time, say about three people because they've got two in there, there would be about three people on each and you would go and see A…*[the technician] *and he would go through the stuff, you tell him what you want say that we wanted a country or you wanted like the disability project. He would click on there and then you would, it would come up with a list then you would if you asked him what they meant he would tell you. If you wanted that he would print them all out for you.*
RQ: *SO HE DID ALL THE WORK AND YOU WATCHED DID YOU?*
Dave/I1: *Because we haven't been told all the like, the access codes and that so that we could get in.*
RQ: *SINCE THEN HAVE YOU HAD A CHANCE TO HAVE A GO ON IT, TO DO THE SAME THINGS AS A.. DID?*
Dave/I1: *No.*
RQ: *DO YOU REMEMBER WHAT HE DID?*
Dave/I1: *Well he typed it in and got in and then he went into, its got like a big, like a big list of all the stuff, and like I would tell him to click on the, say it was a Geography project, tell him to click on the countries or whatever, then it would come up what countries its got on. Then I'd tell him to click on Italy and then he would like get some background information on all of Italy and then I got a map of it with some information next to it. On the disability project I got him to get me a picture of the disability sign like on the roads where the cars park, like on the car parks. I got some information with that and because I was doing Downs Syndrome, I got some information on Downs Syndrome.*
RQ: *WAS THAT ALL AT THE SAME TIME IN THE ONE LESSON?*
Dave/I1: *No. It was, because we started our Geography project before our RE project so like we used it a couple weeks before I did the disability one.*
RQ: *SO HOW DO YOU FEEL ABOUT THE WAY YOU DID THAT, DO YOU THINK YOU COULD GO AND DO IT ON YOUR OWN NOW?*
Dave/I1: *I don't think so. I mean I could be told and then I would know how to do it.*

Gwen/I1: *I went on Encarta.*
RQ: *OKAY, TELL ME ABOUT IT?*
Gwen/I1: *I don't know, my friend told me how to get on Encarta.*
RQ: *SO HOW DID YOUR FRIEND SHOW YOU?*
Gwen/I1: *Well, it went straight past me though, I didn't give it a second thought. I got in to the computer first and then she told me how to do it. I think its got on the bottom 'go to next page' just do that when you want to go to another page, you just type something in then it was like loads of information and I just picked bits out that I needed to know.*

Having parents who are familiar with the technology appeared to offer a distinct advantage;

Cath/I1: *Peter, my Step-dad, he shows me what to do sometimes if I ask him something.*
Karen/I1: *I've got Encarta on CD ROM.. It's in my Dad's bedroom.*
RQ: *DO YOU USE IT VERY OFTEN THEN?*
karen/I1: *I do use it but I have to get my Dad to explain it. It's not very easy to understand. I just like ring my Dad and he tells me what to do.*

Ruth/I1: *I usually just try to figure it out for myself but if I was really stuck then I would ask my parents, they both use IT a lot at work and my Dad is always on the computer doing stuff.*

- Published training material.

There was very little evidence to suggest that the young people in this study used the online help facilities, those that did use online help tended to be the more confident users. The

others who had attempted to use online help were not particularly confident in using it, they were also very sceptical about the amount of help it actually provided them with.

Annie/O1: *You see, do you understand what that means, it means nothing to me. Maybe I asked the wrong question but I don't know what else I could have done.*

Helen/I1: *I clicked on the Help button in Encarta but it wasn't much help. It used a lot of words that made me feel really stupid, I didn't know what it was talking about half of the time, maybe it's just me but I was no better off. I haven't used it anymore, I just ask my friend who sits next to me.*

Ian/I2: *I never use 'Help' now, I did try it a few times but it talks in double Dutch and I don't understand it so I just gave up, there's not much point if you know it isn't going to help you is there?*

Nicola/O2: *I think I'm just really stupid because 'Help' never helps me, mind there's always so much to read that I never bothered going through it all.*

There was also little evidence that printed manuals were used to find solutions to problems or to learn more about the resource. There was an example of one printed manual aimed at novice users being particularly useful to one participant; Cath found a manual that proved to be of great help to her between the first and second interviews. She discovered a great deal about the capabilities of her software through a manual;

Cath/I2: But *I found this book from the new library that's just been built and its 'A hundred and one things to do with a computer' and its by Usborne and its absolutely brilliant. There's 101 step by step guides to doing all this really fun stuff on the computer, like making tape covers, making interactive diaries, address books, I found absolutely loads of stuff that I never used on my computer.*

During the observation that followed this interview Cath demonstrated some of her newly acquired skills. There was a noticeable reduction in the level of tension she appeared to be under during the session. Her confidence allowed her to try some new ideas for the first time during the observation and even when one attempt failed was confident that she could find the solution by going back to the manual. This was actually rare, none of the other young people in the study claimed to have used printed manuals as source of guidance.

7.2.2.2 Discussion of findings

Many of the participants in this research preferred to attempt independent searching before examining the online help facilities of the software. The less experienced participants found the help pages confusing and an added source of pressure. One of the problems of using online help facilities was in actually identifying the correct terminology to apply to questions. There was a lack of correspondence between how the young people perceived their problem and how the systems they used responded to their search for help.

There was a evidence to suggest that observing a skill as demonstrated by an 'expert' was not sufficient to allow the learner to repeat the observed actions. Imitation was difficult in an environment where so many events were occurring simultaneously. In order to reach the point of naturalisation of these skills, the learners in this study needed to be allowed to experience the process for themselves and be helped at the point of error. This would support findings by other research that learning by doing is often the most effective method when using electronic information [Carroll, 1997]. It was difficult for some of the young people to seek out help after they had completed an unsuccessful search. They found it difficult to accommodate new knowledge in the abstract. In order for them to identify their mistake and correct that mistake they needed to be assisted during the search when they could see and experience the process for themselves.

Technical support offered at the appropriate level, location and time appeared to maximise the impact it has on learning opportunities within the electronic information environment. This need not always depend on information transfer from teacher to student, peer interaction offers an alternative dimension. Technical support may be provided in the form of manuals, online support, and one to one social interface support, but unless it is provided at the correct pitch and at the appropriate time, then they do not appear to prove particularly useful.

7.3 Cognitive variables

If EIRs are to enhance the provision of learning opportunities then knowledge of the resource itself and a clear understanding of the processes involved, is vital. There is a need for teacher and learner to be aware of the capabilities of electronic information and to be empowered to make most use of these capabilities. In the electronic information environment it is not sufficient to simply know *what* is available. It is also necessary to be able to locate both the resource and the information, then to retrieve that information. These young people need to be in a position to apply that knowledge at the meta-cognitive level, to be in a position to analyse both their own behaviour and the information they locate. They need to synthesis information from many sources, that includes instructions as well as subject specific information. They must also be capable of making decisions based on their own criteria or rationale.

The cognitive variables of information behaviour in the electronic environment identified by this research are; *information skills*, including the purpose of the search, the location of relevant information, use of that information and self-evaluation of the process, and *navigating the three-dimensional hypertext environment*.

7.3.1 Information skills

Information skills teaching is an area that has been widely researched and there have been a number of models developed which were discussed in Chapter 3. In this section the PLUS [**P**urpose, **L**ocation, **U**se, **S**elf-evaluation] model developed by Herring [1996, p. xiii] will be used as the broad framework for organising the research findings of this study. Purpose is also discussed later as an affective variable where it refers to the reason behind the individual conducting research, for example a school assignment or some personal research. Here it refers to the specific purpose of that assignment or investigation.

7.3.1.1 Research findings.

- Purpose

The young people in this study appeared to be capable of identifying the purpose of an investigation, although they relied heavily on notes from teachers when it came to formal assignments. They very rarely appeared to make any attempt to expand on the briefing they were given for individual tasks. If the homework requested ten facts, then they identified ten facts and made no effort to investigate this any further. The highly prescriptive design of the National Curriculum appears to encourage this type of information behaviour and there is rarely sufficient time for them to attempt any further investigation. There were two exceptions to this, Karen found it necessary to '*understand what it's all about because if I don't then I'm lost, it's no good just copying stuff off and then leaving it, I don't learn anything like that.*' John also found it helpful to expand on the information he collected in order to gain a deeper understanding of the subject. However the most common school-related investigations had a very clear purpose. Fred's comment on the purpose of one search echoed the opinion of the rest of those involved in this research, he said; '*it's just to get the work done as quick as I can and get the best marks I can*.'

- Location

Location refers to selecting a relevant information resource and having the ability to find information within that resource. Some of the young people in this study did discriminate

between various information resources as to which was most relevant for the purpose of the investigation but they did not always base their choice of resource on relevance or fitness for purpose.

Selecting the relevant resource.

Cath/I1: *I don't use the Internet or CD-ROM's for stuff like Chemistry, you know like finding the chemical symbol for things, it's quicker just to use the Chemistry Dictionary in the library.*

Karen/I1: *I would never use the Internet for something like maths homework, what would be the point, we have the text books from school, anyway I'm not sure I trust everything on the Internet, my Dad says I shouldn't without checking it.*

Eddie/I2: *I never use books unless I have to but I know I should for some things, if the teacher gives us a book to find in the class and says that's what we should use for our homework then I do, just to be sure I find the right things. I know I could probably find some stuff a lot quicker by just looking it up in a dictionary or something but I like doing it on the computer so I don't mind if it takes longer.*

Gwen/I1: *Because books don't have loads of information, like an encyclopaedia just has like little bibs and bobs about it, the books just tell you one sentence or so then on Encarta it's got all about Martin Luther King or whoever you're looking for.*

Helen/I1: *Yeah, I think there's more information on Encarta, and there's less in books but it tells you what you need so its easier because you haven't got to look through as much.*

Ian/I1: *I enjoy doing it, quite often its faster, there's a lot more information than you'll find in a single book, like gas, you find the appropriate sites, it gives you a whole load of useful ones. You don't have to walk up and down for ages trying to find a single book, find out if its out. There's quite a variety of information and everything, practically everything, is on there, even things which you would think aren't on there but they are.*

John/I1: *Sometimes I use books but I don't really use them here because you can just get better stuff on the Internet. But if I was going to do something at home I might use a book, if I had to be pushed.*

The majority of young people in this research chose the Internet for reasons associated with apparent 'ease of use' or affective preferences rather than the appropriateness of the resource. The positive potential of this attraction was evident in the time and effort often expended on Internet research.

Bill/I1: *It's easy to find things on the Internet.*

Fred/I1: *The Internet is easier than books because all you have to do is type in the words you're looking for.*

Gwen/I1: *It's quicker to find what you want on the computer, not like having to read through loads of stuff in the books. It is quicker if you know how.*

RQ: *WHAT ABOUT ENCARTA THEN, DID YOU USE THAT?*
Karen/I1: *I didn't use it for that but I usually use Encarta, it's much easier, my dad helps me out.*
RQ: *WHY IS IT EASIER?*
Karen/I1: *Because you don't have to keep lugging all of these big heavy books off the shelves. It's just easier to find, you just type it in and there it is instead of looking through all the alphabet and then finding you've spelt it wrong.*
RQ: *YEAH BUT WHAT IF YOU'VE SPELT IT WRONG WHEN YOU TYPE IT IN?*
Karen/I1: *It usually tells you, if its a spelling mistake it can't do it. It gives you like the nearest. If you type in Astro it usually comes up with like astronomy. I don't think I'm much good on it but it's still easier than books.*
RQ: *WOULD THAT NOT GIVE A HUGE AMOUNT OF INFORMATION?*

Karen/I1: *I would type it in and then when it goes down the screen I'd go to the one I'd wanted, then I'd just look at the one I wanted.*

Nicola/I1: *Yeah, the computer is much better because it's all on there and all you have to do is type in the right stuff.*

Pam/I1: *Not very often because the Internet is actually easier than using books. I've had a look in here but I gave up after a while.*
RQ: *REALLY, WHY IS THAT?*
Pam/I1: *I couldn't figure out the order to be honest, and then I figured it out but it's a bit late now.*

Pam/I1: *It separated it into paragraphs already and so it was easier to separate, where in books you've got to go through a whole book you can minimise the information on the Internet, you can sort of, you can only read what you want to read and miss bits out, but in a book you've got to sort of read all the way through it. Then you can shorten the search, like refine it, so it only searches for smaller bit of information as opposed to reading through a whole book and siting trying to remember what was at the beginning. You can flick back with the Internet as well, really easy, you just sort of move up, instead of turning pages back and trying to remember where it was.*

Pam demonstrates a paradox in this statement. The common assumption is that one of the complex issues of the electronic environment is the need to be capable of navigating through that environment, indeed it has been identified by this research as a major issue. Yet here it is being hailed as one of the benefits of using the Internet, although there was no observed evidence to support this view. There was, on the other hand, considerable evidence to suggest that being able to *'flick back with the Internet'* was a great deal more difficult than was suggested by this statement. Comments made during interviews regarding ease of use of EIRs were rarely substantiated by observed behaviour;

Ian/O2: '*It's just so painful, I know it's there but it takes so long, it takes hours, I hate it.'*

John/O1: *It's a bit annoying really, it goes so slow, I usually have a game running so I can play that while it's searching.'*

Pam/O2:*'What am I supposed to do with all of this? I wish I'd never typed in volcanoes, I'm the one who'll explode.'(Pam slaps the screen)*

There is evidence here to suggest an element of *typification* relating to what these young people assumed or believed the resource was capable of and the actual reality of the situation.

Search strategies.

Applying search strategies to locate relevant information within the resource appeared to be a complex issue when using electronic resources;

Bill/I2: *All you have to do is type in the word you want, you know, I type in 'football' and that gives me all the stuff on football, its easy. I do that on Encarta at home so I'll do the same thing when I go on the Internet.*

Helen/I2: *Miss says you can type in whatever you're looking for and it gives you loads of different sites to choose from, you just pick the one you want then you've got all the stuff you want.*

Helen/O2: *I think I must have typed in the wrong word, I don't think this is all about the Industrial Revolution, the names are a bit funny, I'll try again.*

Helen had typed in 'Industrial Revolution' on the Altavista Home Page, she received over 45,000 hits [she did not notice the number], she read through the first ten titles, none of which appeared to be appropriate. During the following fifty minutes she made repeated attempts to locate a suitable site to carry out her project research, the session ended without any information being retrieved. Helen said; *'I told you I was a bit stupid, I made a bit of a mess of that, I bet there's loads of stuff on there I could have used.'*

Ruth was explaining in an interview why she preferred using the Internet to books;

Ruth/I1: *Because you don't have to do so much, you just have to like search and type in what you need instead of having to go to the library and look everything up and find the book you want because sometimes the books aren't there. But everything's on the Internet.*

A week later during an observation Ruth was looking for information on photosynthesis for a biology project, she needed historical details concerning discovery. After forty five minutes of searching through the information she had retrieved after typing in 'photosynthesis' she said there was nothing there relating to her assignment. She had left the research until the last minute because she was certain she would find everything on the Internet. Ruth was becoming more and more anxious during the observation yet refused to stop searching, she did not refine the original search, convinced the information would be provided if she just kept going. Eventually, however, she gave up, she was highly stressed and informed the researcher she would never rely on the Internet again.

This problem also occurs with CD-ROM encyclopaedias, Cath was searching for information on horses and wanted to know something about a specific breed, there was confusion in the way she interpreted the terms and assumed the resource would agree with her interpretation;

Cath/I1: *You can look up the word 'horse' but you can't look up different breeds because I tried to type in 'Arabs' and it came up 'Arabs' as in, you know, the desert people, I wanted the horse Arabs. It's useless like that.*

Cath abandoned that search and was convinced that the CD-ROM contained nothing on the breed of horse she was looking for. Dave, who was a very inexperienced Internet user and had no access outside of school, carried out a very successful first search on the Internet. It was not school related; it happened during the first week he was given access to the Internet and he wanted to show his mother what he could do. He carried out a basic search on a current and popular subject, an actor. There was no need to limit the search, he wanted as

much as he could get. In his opinion the search was highly successful and he was prepared to use the same search engine again for school related subjects, something he talked about with confidence because he had not yet experienced failure;

Dave/I2: *Me Mam, she hasn't been up to the Library yet but if she wants I'll take her. I got her some information off the Internet about an actor that she likes to show her what it could do.*
RQ: *SO WAS SHE IMPRESSED WITH THAT?*
Dave/I2: *Yeah. I just said I would get her some information today and I don't think she expected it straight away and I just brought it in. There was loads and all I had to do was type in his name.*

- Use

The term 'use' in the context of the PLUS model applies to the process of selecting and rejecting information, reading through the information, taking notes on the information and presentation of information.

Selecting and rejecting information.

Bill, who has maintained throughout the research that he prefers 'Encarta' to any other information source available to him, expresses frustration with the content of the resource;

Bill/I1: *It was alright but it was a bit complicated. It's just loads of information, it should be less complicated for us to understand.*

Pam often mentioned the Internet being quicker and easier yet when she was talking about an actual search the reality was somewhat different;

Pam/I1: *When I did Geography before we changed I had to do some work on volcanoes and I did some more the other day but I can't remember, oh, I did some on JFK for History, on the assassination of JFK and that was helpful, but the volcanoes just went on and on and on about absolutely everything so I had to keep refining it until you get down to what you want. It took me a couple of days, in fact I gave up and I still haven't handed the work in, I was just so mad with it, it was hopeless, or I was.*

It is interesting to note that Pam used the term 'refining' in this quote. This occurred on many occasions and when this was investigated more closely it was discovered that it was those who used the Internet frequently who used the phrase. Internet search engines use the term 'refine' or ' refining your search' constantly. End users appear to accept the terminology and introduce it into their own vocabulary. The term was never used in connection with print based information. All of the participants who were somewhat unfamiliar with electronic information expressed confidence in the information they found initially. Even those who used it as an information resource regularly were not critical about the content. As the interviews and observations progressed they began to confess that they were never sure what to believe on the Internet but they remained confident about the quality of information on CD-ROM encyclopaedias;

Early interviews;

Annie/I1: *The Internet is great, everything is on there, CD's are bit harder to understand but it's all there, well I think it is, I can't always find it but that's me I suppose.*

Bill/I1: *Yeah, well it's got to be if its on the computer doesn't it? It can't be lies can it?*
RQ: *OKAY, WHAT ABOUT THE INTERNET?*
Bill/I1: *Same. I think it's all, well it would have to be true won't it.*

Dave/I1: *Well it's on the computer, I mean it got on there somehow so it has to be right.*

Lee/I1: *We use it in school so it must be okay, they wouldn't ask us to use it if it was all wrong would they?*

Matt/I1: *I don't think about it, it's there so I just use it but they couldn't say it if it was wrong.*
RQ: *IS THAT THE INTERNET?*
Matt/I1: *Well, the Internet and the CD-ROM's, it's all the same.*

Later interview;

Bill/I2: *Because if you see something that's been repeated then it could be true because lots of people have actually wrote it but if there's just one web site then you don't trust it as much, that bit of information.*

Dave/I2: *Well on the Internet I think its more what people put in as themselves than what actually happened, like they might be supporting a view or something, but with like the text books they are always giving you everything you need to know, you might not find anything on the Internet that you need.*

Lee/I2: *Well I don't know, there's some pretty weird stuff on the Internet, I'm not too sure about that, I never thought about it until you started asking me questions about it. You know that stuff I got the other day when you were here, that was a bit weird and didn't say much about Martin Luther King did it. I don't know, maybe it's better to just use CD-ROM's.*

Matt/I2: *I got some funny stuff about a chemistry project I was doing, it all looked a bit odd, I used the science books in the library in the end because I couldn't make sense of the stuff I got from the Internet.*

Those who were very familiar with the Internet, in particular those with Homepages of their own, were very sceptical about information on the Internet;

Eddie/I2: *Depending on where its from as well, like if its from a Web site it might not be so reliable so I'd check it, like Microsoft Encarta, its Microsoft company and they wouldn't put anything in without researching it or getting professional people to write the articles.*

John:/I1: *Well anybody can put stuff up can't they, so it doesn't all have to be true. The stuff on my homepage is true but I could say anything I wanted and who would ever know. You can't use it for proper work all of the time, it takes ages to suss out the right stuff unless you just use pages you've found before and know they are okay.*

Eddie, a high achiever, found it relatively easy to describe how he judged information on Martin Luther King:

Eddie/I1: *Well that stuff we did on Martin Luther King, you have to be careful, it could just be somebody's opinion, like if they liked him and supported him they would say all great things and if they were against him they would say all bad things. It's better just to get the facts from an encyclopaedia, he's still got a lot of supporters you know and they write things on the Internet but I don't know if it's all true.*

Reading the information.

Annie/I1: *Because some of the ways it's spaced out, long paragraphs are written in books and you can't understand it because they change all the words to these big words and you can't understand it.*
Bill/I1: *Just 'because its better off the computer, because you get more detail on the computer off particular topics. Instead of reading through a whole book to find what you want.*

Fred/I1: *The Internet would be like much easier to do, because like you can get loads of pages and its much more easier than looking through a book. You can actually get like pictures up on the screen and little fill ins and that, see what's happening.*

Fred/I1: *Because there was a lot to do and the text books were like the big thick ones with lots of little writing in them, like they had so much information in it was hard to pick out the best parts to put in.*

John/I1: *It's easier, it's much more user friendly, because like in a book you've got say twelve volumes in an encyclopaedia of science, you have to go through each volume of the encyclopaedia looking through the index trying to find where you want, trying to find the page, and all that and having to search for it. But on the Internet you just click on the word you want and most of the time you do get what you want but like I said you have to go through a few steps but its quicker than going through all the books.*

Taking notes.

Eddie/I1: *No, I just looked through the main information that I want to, well that I needed, I highlighted that, copied it and I opened 'Word' and I pasted it in there. Then I got a picture of a map of Italy, I copied that and pasted it into Word as well, then I put it in me own words, then printed it out with bullets, just the main points.*

Gwen/I1: *Sometimes you get wrong for printing straight off like because then its copying, so I just stay on the safe side and write it, I've heard some people taking stuff off the computer and putting it into their own file but I don't know how to do that.*

Ruth/I1: *Well I just got the information I needed by going on like a thousand web site and I just made notes or printed it out and typed it on the computer.*
RQ*: DO YOU TAKE NOTES BY HAND FROM THE COMPUTER?*
Ruth/I1: *Yeah, I just made notes and then type it up because it looks better, my writing's not much good.*

Annie/I2: *Because more people are starting to use it and they're getting more interested in it and its easier to use because you can just take what you want out of a paragraph and put it onto a page and print it. So you've got what you want instead of having to hand write notes, highlight it photocopy and all that, its easier now.*

Bill/I2: *When you go on Encarta the word you typed in is highlighted, I just copy and paste the sentence around that word, it's easy.*
RQ: *DO YOU EVER READ MORE OF THE INFORMATION?*
Bill/I2: *No, just the bit around the word.*

John/I2: *I usually highlight the bits I want copy and paste them into a 'Word' document and use that to write my essay, I change the words around and put it in what sounds like my writing.*

Presentation of information.

Bill/I1: *You can't just print it out and hand it in, it has to be your own work*

Dave/O1:*I won't just print this out and hand it in, that wouldn't get me a good mark because I can't write like this and they know that, you have to put it in your own words, like write it out again the way we speak.*

Gwen/I1: *If you just hand in the printed stuff you wouldn't get any marks and they might stop you from using the computer, you have to write it yourself.*

Matt/O1: *This looks good but you need to write it in your own words, they tell you that before you use the computers in here, they don't like you printing too much stuff off.*

Some of the young people in this study who were more familiar with the technology had identified a way to get over this, again this was seen as a way around a restriction in order to complete a task, not as a means of learning;

Eddie/O1: *I'll cut and paste this into a Word document then I can change it around without too much effort, I'll take out all of the really clever words and put my own in that way it'll sound like my work and not something I just printed out.*

John/I2: *I cut and paste the stuff I find and then change it around, you get wrong for handing in work that's comes straight off the Internet or Encarta, they know because I can't write like that, just change it to sound like I wrote it.*

This is not always the case, one participant identified a personal need to produce her own work regardless of the resource used to locate her researched material;

Karen/I2: *I have to print out the stuff I find and then take it away and read it, I can't read it from the screen and if I just copy it then it doesn't go in. I have to read it and then write it out in my own words before it makes any sense.*

- Self-evaluation

There was some evidence to suggest that these young people were able to evaluate their own information skills, however they did express some dissatisfaction with the level of training they were offered;

Annie/I2: *I think we need to be shown some more, like different search engines so if people don't have it at home and don't know how to use it themselves anyway, then they just use Yahoo and they aren't getting the best information and stuff. People just see it as a leisure thing like for chatting and stuff like that.*

Cath/I2: *It*[the one Internet training session offered during the year] *did no good. There's supposed to be more Internet training but I think they just gave up and hoped we'd forget about it. They showed you what your password was and that was it. They didn't tell you how to send emails, they didn't tell you how to receive them. I found out by going on my computer, I did manage to get on to my mail site but that was total coincidence, I knew the basics. I had a friend right, she went on that Internet training as well but she hasn't got it at home, I had to show her how to get on because she couldn't do anything, I trained her and I just had to learn by myself and my step dad showing me it.*

John/I2: *Everything I know I learnt at the course I did on Saturday mornings at the college, my Dad paid for that, nobody ever showed me how to use anything in here, they just set it up and that was that. We never had training on it or anything everyone says the Internet is easy, well if its so easy I wish they would all stop asking me how to use it when I'm trying to get on with my work.*

Lee/I2:*I'm not sure I'm doing things the right way, I get there in the end some of the time but it should be better than that shouldn't it?*

Matt/I2: *I like going on the Internet but I'm sure there's a lot I'm missing, I know some people are a lot better than me at using it but I'm not the worst so I don't know what those that haven't got any Internet connection will do when they have to use it.*

There appeared to be little encouragement for self-evaluation in terms of the information seeking process, this research demonstrated that none of the schools in the study offered structured teaching in the use of EIRs.

Matt/I2: *I never look at work I've been handed back, only for my mark, I never go back through it. What's the point, it's done now and that's it.*

Ruth/I2: *It's like in Maths you have to show your workings out, you never have to do that with other stuff, you just write your essay or your report and hand it in. Why would you bother to keep notes about what you did, nobody is going to ask you to hand it in and you don't get any marks for it.*

There was evidence to suggest that the general opinion was that using EIRs was *quick* and *easy*. Teachers regularly advised students to *look on the computer*, without being any more specific;

Annie/I2: *They just tell you to look on the computer and see what's there, I don't think half of them can use the Internet, in fact I don't even know if they've all been on it yet, I doubt it.*

Dave/I2: *We got told to look on the computer for the stuff on disability the teacher said we would get loads of stuff from there.*

Matt/I2: *Because it's like a social question, you know, how people feel about animal rights, we were told we would find loads on the Internet, we did but it looked like a load of rubbish to me, just people giving their opinion without much to go on.*

Ruth/O2: *Look at that, now Mr…*[teacher] *told us to look on the computer, I'm going to tell him it was a load of rubbish.*
RQ: *DID HE ASK YOU TO USE THE INTERNET?*
Ruth/O2: *No, just the computer but what else did he mean? There is nothing else, I don't think there is anyway and he didn't say, just that it would be quicker to use the computer.*

7.3.1.2 Discussion of findings

Because of the proliferation of information available through new media the acquisition and application of information skills needs to become more efficient and effective. [Johnson, 1995] These skills have been identified as being central to the teaching curriculum and essential if the learning opportunities offered by EIRs are to reach their full potential. The restrictions placed on access by space and time need no longer be the barrier they once were. Young people can explore resources that would once have been well out of their reach.

7.3.1.2.1 Purpose

Identifying the purpose of an investigation or assignment is an important aspect of the selection of any resource, is it factual information being sought, or is it insight and knowledge? Some of the young people in this study appeared to be capable of identifying which resource to use for which type of information but their ultimate choice of resource was often dependent upon other factors relating to affective variables, which will be discussed later in this chapter.

7.3.1.2.2 Location

When identifying and locating relevant resources, the purpose of the task was not always the primary criteria for selection. Many of young people in this study identified the resource based on 'ease of use' or perceived 'ease of use'. There were consistent references to how easy it was to locate information on the Internet and, less frequently, on CD ROM. Yet observational evidence showed that this was very rarely the case and these young people experienced major difficulties when using these resources. This illustrated a feature that this research has identified as being highly significant to the use of EIRs, the concept of *typification*. These young people have built up their own impression of the power and capabilities of EIRs and perceive this as reality. Constant reference to the ease of use of the resource by those who had authority, such as teachers and technicians, had created a belief that a typical experience of searching on these resources was one of ease and speed. Even when this perceived reality is contradicted by their own experience they reverted back to their initial perception after the event.

The ability to locate information through electronic resources places a greater emphasis on the need to understand the concept behind formulating search strategies and to be capable of devising effective strategies. Using search engines to locate and retrieve relevant information frequently created problems for the young people in this study. The retrieval capabilities of many systems are often only explained on the 'Help' pages of the search engines and the participants in this study rarely visited these. Using broad search terms often led to vast quantities of information being offered. Often this was not relevant to the search, which created high levels of anxiety and confusion. This anxiety can often distract and is a potential barrier to any learning opportunities which may be derived from both the process and the result. Students demonstrated little knowledge of search strategies, frequently relying on single keyword searches and spending a great deal of time returning to the start page to type in different keywords.

There is a danger that frequent episodes of search failure could lead to low level of confidence in their own ability and low levels of self-esteem. As each new instance of search failure occurs it is assimilated into previous failures. The popular rhetoric associated with electronic information indicates that ease of use is expected. This indicates to these young people that the fault must be their own. If the resource is as simple and effective as

they are constantly being led to believe it is, then the obvious explanation of failure is to assume the responsibility is their own. This responsibility was assumed almost immediately after each failed search. If this continues to happen then it does not take long for these young people to start predetermining the outcome of a search before it begins; they anticipate failure. Anticipation of failure can then result in a reluctance to use the resource, and reduced motivation could be a negative factor in any subsequent learning that could take place. The evidence from this research would indicate that when the first search is highly successful it instils a confidence, which encourages and enables the user to attempt more adventurous and complex tasks. Simple, successful, first searches build confidence levels and encourage further use of the resource, often increasing the desire to learn more efficient and effective methods. The success of the search carried out by Dave on behalf of his mother referred to earlier, did not create feelings of complacency. He became very keen to use the electronic resources that were available to him and claimed that he was going to learn a lot more about how to use them. This was in striking contrast to Dave's feelings after he had watched the technician performing a search on his behalf [reported in the section on technical support].

7.3.1.2.3 Use.

Selecting relevant information has become a far more complex task now that vast quantities of information are available through electronic resources. Regardless of their level of competency in using the software, all of the young people in this study found having to cope with vast amounts of information difficult and distracting. Although the majority of them had given the impression that they preferred EIRs to all others, they were a great deal less sure about the quality of the information they retrieved and the quantity they had to cope with.

The GCSE History syllabus specifically refers to the pupil being taught to discriminate between types of information, to pass judgement on whether the information is biased or a factual account of events. Even if this is put into practice, it does not appear to be transferred to other subjects in relation to the source and nature of the information. Even those who understood the principles behind this critical judgement did not always apply it in other areas. They were able to be critical in relation to History research, but compartmentalised this as an aspect of that subject, not as a generic approach to information seeking. Eddie was the only example from this study that demonstrated a deeper understanding of the Internet as

an information resource. Eddie had his own Homepage and was acutely aware of how easy it was to make information available on the Internet. The combination of this knowledge of how information could find its way into the public domain and a highly critical approach caused him to be cautious about any information he located through that resource. Eddie was the exception in this study. Transferring skills learnt in one area of study and applying them to another area is often taken for granted by teaching staff but there is little evidence to support these claims in this study.

There appeared to be very little evidence that the participants in this study were particularly competent in reading and scanning for information in print based media. They regularly referred to reading through the entire book to find the relevant information and appeared to have a very limited knowledge of scanning. Using CD-ROM's which highlight the word used to identify the information negates the need to scan, the word itself is highlighted on the page and it is possible to copy and paste the surrounding text. This facility is not a typical component of Internet searching, there is often no alternative other than to scan the page for relevant information. Unfortunately the young people in this study found this particularly difficult and often gave up when faced with vast quantities of text. Only those most familiar with the technology were able to use copy and paste facilities to take notes from electronic text. The most common form of note taking was to make hand written notes from the text on the screen. The use of information did not appear to be related to level of academic achievement, both low and high achievers would take information directly from the electronic resource and attempt to transfer it into their own with the minimum amount of effort. The greatest difference was that the high achievers appeared to be more skilled in the method they used to accomplish this and could make greatest use of the technical features available to them.

When asked how they used the information retrieved from electronic resources the most common response was to deny printing or copying directly from the resource. Although copying was never specifically mentioned in any of the interview questions, these young people appeared to associate questions concerning use of the information with instructions they had been given about not copying information directly into Word documents. Printing directly from the computer and handing in print-outs was discouraged in all schools but

these young people saw this as a restriction, they did not appear to understand why this restriction had been placed upon them. Only Karen mentioned that only by reading the information and then writing it in words that made sense to her did she learn anything about the subject in question.

Previous research has shown that the information skills needed in the electronic information environment are the same as those needed in the print-based environment. [Herring, 1996 & NCET, 1993] Other research claims that it is not sufficient to rely upon young users simply transferring information skills learnt in a print based environment to the electronic environment. [Yang, 1997] This research has identified a basic lack of information skills regardless of the information environment, but where there was evidence of some print based information skills there appeared to be little evidence that these skills were transferred to the electronic environment. Although information skills training has been identified as core to the National Curriculum, there appeared to be little consistency concerning the teaching of those skills both between schools and, in some cases, in individual schools. All of the schools in this study had written policies on information skills training but only two of the four were actually running the course regularly and offering consistent skills training throughout the school. None of the schools offered information skills training for EIRs. When training was given, it was training in technology and the school technician provided it not a teacher or the librarian.

7.3.1.2.4 Self-evaluation.

This study found no evidence of self-evaluation by the individuals involved. Their view was that locating and using the information was a means to an end and as it was only the end result that was ever assessed, then why would they concentrate on the process. They were not assessed on how they had located information and they were not required to provide any evidence of how they had conducted their research for assignments. They did not return to completed work and examine their own behaviour so naturally there could be no opportunity for them to learn from any errors or to identify any examples of their own good practice.

7.3.2 Navigational skills

A review of previous research has revealed that navigating the three dimensional space of both individual hypertext documents and multiple documents, can often become a barrier in

the use of these resources [Borgman, 1995]. This is an area that is exclusive to the electronic environment and although it is possible to move through print based resources in a non sequential way, it is not an intrinsic element of the resource.

7.3.2.1 Research findings.

Pam/I1: *It separated it into paragraphs already and so it was easier to separate, where in books you've got to go through a whole book, you can minimise the information on the Internet, you can only read what you want to read and miss bits out, but in a book you've got to read all the way through it.*

John was fully aware of his location during a search on 'Karate Schools', he used the system functions to go back to previous locations, mark relevant sites and return to his original starting point;

John/O2: *There's loads on here about Karate, you need to be careful though, loads of it is American, it's no good if you're looking for a school to go to and it's in Las Vegas or something. I'll go back and show you that one we saw before, that was American.*

Nicola did not have the same experience during a search on 'Art Nouveau'. She used 'Find Wizard' to begin but did not follow this up by looking at any of the 'hits', after every move she went back to the start page before trying to refine the search. After about thirty minutes she gave up claiming there was nothing there although some of the information had looked promising;

Nicola/O1: *This is pointless, there's nothing on Encarta about this, I suppose I should have looked somewhere else but I thought it would be here, I could go on like this all day, it's a waste of time.*

Gwen/O1: *This is stupid, I know I just had something on that, where's it gone? I should have just printed that page off when I had it, I can never find the same thing twice.*

Annie/I1: *I sometimes get quite lost if I've been on loads of different pages, I can never remember where everything is and I get really fed up.*

Ian/I1: *I always get lost when I'm trying to find stuff, you know, like never being sure what bit your in, I can use that Back button thing at the top of the page but that's about all.*

Lee/SL: *Me and ...*[a friend] *spent the whole lunch time trying to get this stupid thing done for Geography, it's about people who live in Third World Countries, we kept getting stuff but I was sure there would be better stuff if we kept on looking. There wasn't. We ended up with nothing because I couldn't remember the address of any of the pages we had been on so we couldn't go back.*

Matt/SL: *It was really stupid today, I spent my whole lunch break looking for stuff about World War 2, there was too much. I kept findings really good stuff then going to some links but I could never remember where I had been. Idiot!*

7.3.2.2 Discussion of findings.

There has been considerable research carried out into the navigation of the physical space of hypertext, the research has demonstrated a 'striking consensus…that this process is the single greatest difficulty for readers of electronic text.' [Dillon, 1994, p.41]

During his search on 'Karate schools' John moved around through the search for the whole session [1 hour], always seemingly aware of his location and always confident of his ability to return to previous locations or to move on. He found the information he was looking for and had used the time efficiently. There was no indication that he had been distracted from the initial task during the process. This search was relaxed and fruitful, which proved to be in striking contrast to the search carried out by Nicola. She became very annoyed and said that she was confused. The disorientation of moving through pages without being able to retrace her steps left her frustrated and unwilling to attempt further navigation through the system.

Many of the young people in this study found it very difficult to maintain a mental picture of their location within the resource without having a physical location as a point of reference. This often left them feeling disorientated and anxious. This disorientation and anxiety often led to distraction from the main task and interfered with any learning that may have taken place. Often they would end a search feeling powerless and assuming the fault lay with them rather than the system. This reduces confidence levels amongst the students and lowers self esteem. It may reduce the extent to which they are prepared to take risks and so reduces the opportunities to learn. When this is combined with information they had already internalised concerning the ease of use of electronic resources it appears to compound the problem. They become even more convinced that they are to blame and conducting a poor search becomes more important than getting the initial task *wrong*. Nicola was far more concerned about her failed search than she was about not having any information on 'Art Nouveau' for her homework project. As a consequence, and far from being a liberating factor, the non-sequential nature of hypertext often created anxiety in this group of users. EIRs exist in a three-dimensional space. End-users have to develop their own frames of reference, remembering their 'physical' location within that space. The participants in this research demonstrated varying levels of understanding relating to their ability to navigate through the space. There appeared to be a direct link between being aware of their physical location within the resource and the level of anxiety experienced during the search.

There was evidence to suggest that where information skills policies did exist there was a link between this and successful use of the resources. One school in the study did introduce

an Information Skills Policy during the fieldwork. It was done in association with all subject departments with central control remaining with the Librarian. Although there was insufficient time remaining in the study to follow this up in-depth, there was evidence to suggest that this co-ordinated, organised, school-wide policy could impacted in two areas. Teachers became more aware of the need for information skills, for both themselves and their pupils. Structured 'lessons' indicated to the pupils that there was a need for training and that not all failure in terms of searching was attributable to the individual.

7.4 Affective variables

In 1984 Sherry Turkle claimed that;

> 'Computers call up strong feelings, even for those who are not in direct contact with them. People sense the presence of something new and exciting. But they fear the [computer] as powerful and threatening.' [Turkle, 1984, p.3]

This claim may well appear to be out dated yet this research has demonstrated that computers still have the ability to 'call up strong feelings' in many users. The computer has developed a level of 'personalisation' which encourages references to 'user-friendliness.' [Underwood & Underwood, 1990 p14]. As a consequence of this there are significant factors concerning the affective domain that could be potential barriers to any positive impact these resources could have on learning opportunities. This research has identified a number of affective variables of information behaviour in the electronic environment; *motivation* to use the resource, to learn more about the resource and often to own the resource, the *purpose* of using the resource, the *physical location* of that use, *user expectations* and impact of *self-concepts*.

7.4.1 Motivation

Motivation is having the incentive to carry out or to accomplish a task, the driving force behind an action or set of actions. Having physical and intellectual access to EIRs has become part of today's youth culture. The young people in this study were surrounded by images of technology that implied success and status.

7.4.1.1 Research findings

Motivation to use EIRs appeared to be related to the computer being *fun* to use, the nature of the academic task and personal interest. Access to EIRs also appeared to encourage use of print based material in certain environments.

- The computer is fun

When asked about their use of electronic resources the participants talked about it being more fun, more interesting and opening up new worlds they had never seen before;

Bill/I2: *Everything looks better on the computer, its more interactive, you can jump around and have more fun looking for things.*

Dave/O2: *It's more interesting on here isn't it? I mean there's loads of stuff you can click on to that you might not have looked for in a book, or at least not the same book. I don't know, it's just better.*

Helen/I2: *Well it's more interesting really, you know, more stuff to look at and it looks better, it's all colour and that, not like a book with loads of small writing that you don't always understand.*
RQ: *SO DO YOU UNDERSTAND EVERYTHING ON THE COMPUTER?*
Helen/I2: *Well no, but it's better because it's more fun and I look for more, I can find something I understand and we only need a few good points to have enough for the homework to be done.*

Ian/I1: *If I get bored I can open a game for a while and that stops me being bored, it's more fun to do it on the computer, I wish my Mam would buy me one.*

Karen/I2: *Well I like reading, I've got loads of books at home, but it's different on the computer, it's a different kind of fun. I wouldn't read the computer screen in the bath but it's better for looking for stuff.*

Pam/I2: *I get a bit frustrated at times but it's still loads better than looking through all the books, I spend longer looking for things but I'd give up if I was using the books in the library because I'd get bored quicker. It's more fun using the computer.*

- School related research

The type of work which encouraged students to use electronic resources was what they referred to as 'projects'. Subjects most often mentioned were Geography and History, and occasionally languages, rarely maths or any of the sciences;

Annie/I2: *I found loads of stuff for my Third World project in Geography, there's so much. It was great and I managed to put a really good project together.*

Bill/I2: *Well, if you were doing a project or something you could get it off Encarta or the Internet to help you with what you were doing. Something useful. It's more interesting than the books.*

Dave/I2: *I tried going on to find some stuff about chemistry but it was too jumbled up, the books are easier.*

Cath/I2: *Well at the minute I'm doing a perfume package assignment and I've done it on an Australian theme, but I'm going a step further and I've done a commercial on the computer for my product.*

John/I2: *Well actually I knew the specific web site. There wasn't a search involved, actually we typed in the address, it took 5 minutes to get to the page, click on the button to let us in took another 5 minutes, and I had to go through all the different lists, products, security, then alarms and all that took about another 20 minutes, its so painfully slow. But it was worth it.*

- Personal interest

Subjects of personal interest encouraged the most frequent use. There appeared to be a direct contrast here between female use of chat rooms and male use of games. Very few of the females in this study used the Internet or CD-ROM's to access and play games, likewise few of the male members of this study used chat rooms, although the males were more inclined to try out chat rooms than females were to investigate games;

Bill/I1: *I go on for football stuff most of the time and games. Sometimes I look up stuff about music, you know bands and that.*

RQ: *SO WHAT OTHER SORTS OF THINGS DO YOU FIND ON THERE?*
Fred/I1: *Just like for fun, I can type in like some fun games and that.*
RQ: *RIGHT, DO YOU JUST SIT THERE AND PLAY THESE GAMES?*
Fred/I1: *Yeah.*

RQ: *RIGHT, DO YOU HAVE ANY CAREER PLANS?*
Ian/I1: *Well, I used to want to be a Vet, but then I saw Animal hospital and saw all the guts and gore, that changed me mind so now its probably something to do with computers like animation for games and what have you.*
RQ: *SO ARE YOU INTO GAMES THEN?*
Ian/I1: *Yeah, I like computer games, I don't like racing games because they drive me up the wall. They are really boring, like broom, broom, broom. I like space ship games where you go out and blow each other up and things, they are usually 3D which is better, moving in three dimensions is better than racing games where you just go round and round and round, and I like some of the older games, like 'Lemmings', that's only an Amega games, it seems to work on will power alone, you know.*

RQ: *SO WHAT DO YOU NORMALLY DO, IS IT STUFF FOR YOU OR IS IT STUFF FOR SCHOOL?*
John/I1: *Me, probably games.*
RQ: *GAMES, WHAT ELSE?*
John/I1: *I might do some school work, but mainly I might go on web sites to look for games and that, look up new games, cheats and all that.*
RQ: *RIGHT, WHAT SORT OF GAMES DO YOU PREFER?*
John/I1: *Role play games like mysteries and all that.*
RQ: *CAN YOU JUST GET ON TO THESE GAMES OR DO YOU HAVE TO SUBSCRIBE TO THEM OR SOMETHING?*
John/I1: *Some places you have to subscribe, but for some small games that are quite good you just go straight on. There're quite a few sites, yeah there's loads.*
RQ: *SO YOU WOULD SPEND MOST OF THE EVENING PLAYING GAMES?*
John/I1: *Yeah.*

RQ: *WHAT SORT OF THINGS DO YOU DO ON THE COMPUTER?*
Lee/I2: *Play games and stuff.*
RQ: *WHAT SORT OF GAMES?*
Lee/I2: *Driving games, football games and stuff.*

Lee/I2: *Well I have priority because it's in my room, sometimes I just spend a couple of hours just playing on games. If I'm not in the house she* [sister] *just goes up and uses it but if I'm in she asks.*

Gwen/I1: *You go to 'Teen Chat', it takes ages to get in there, and you can't always get like 'Teen Chat'. You either go to 'Teen Flirt' and all the other places to chat are on there, you can't exactly get the one you want all the time cos there's different things. Granddad says its canny rubbish cos like you can't exactly get like what you want, and you just chat to people for ages.*
RQ: *DO YOU CHAT TO THE SAME PEOPLE?*
Gwen/I1: *No, always different people.*
RQ: *DO YOU EVER DO ANYTHING ELSE ON THE INTERNET?*
Gwen/I1: *No.*

RQ: *HAVE YOU GOT ANY HOBBIES?*
Pam/I1: *I like to read, I go to Air Cadets, I'm training to go into the RAF but I don't think I'm going to go anymore. I do like computers but I haven't got one at home so I do spend a lot of time on the school ones, its a bit cheeky but I do spend a lot of time on 'chat rooms'.*

Pam/I1: *We'll still be here at half past five sometimes because nobody chucks us out. Nobody really notices cos there's a bell that goes at quarter to and you've got to be out by 5 but from 4.30 you're allowed on the chat rooms so people completely lose track of the time anyway and then people are still on the chat rooms at 5.30 and the staff here just give up and go home. So we end up sitting here until someone remembers they've got to get a bus and then when they walk out everyone else starts to realise and goes as well.*

RQ: *ARE THERE ANY RESTRICTIONS IN HERE ON WHAT YOUR ALLOWED TO DO?*
Ruth/I1: *Yeah, you're not supposed to go on the chat rooms unless its after school and your not supposed to go on illegal pornographic things, your not supposed to go on games and stuff that isn't for school but you always do.*

RQ: *ARE YOU ALLOWED TO GO ON CHAT ROOMS?*
Annie/I1: *You're not but you can get through it easily and that's all people do, you just make a backup screen and put that up when the Librarian comes and she doesn't know.*

Karen/I2: *It's all the chat pages, I want to go on but I haven't yet, my friend has done it loads of times and she sends all sorts of strange messages, they aren't true. It would be fun to have a go and see how much they believed of what you told them.*

- Encouraging use of other resources.

Providing access to electronic resources in the library or learning resource centre does appear to encourage the use of other resources available. Many of the participants originally joined their public library in order to use the computers but have since started to use print based reference works. Many of them talk about using the print based material if they are 'in a hurry', which would appear to contradict their claims about the computer being quicker;

RQ: *SO YOU USE THE LIBRARY A LOT MORE NOW?*
Bill/I2: *Yeah, I'm on the computers every day so if I need anything else I use the books in the library.*
RQ: *WHAT SORT OF THINGS DO YOU USE THE BOOKS FOR?*
Bill/I2: *You know, quick stuff, like if I need to find out about a chemical and all I need is the symbol thing, it's quicker to look in the science encyclopaedia on the shelf, I think it's called the reference shelf, yeah.*

Matt/I2: *I usually only go on the computers but if I'm in the library anyway I can get some other stuff done.*
RQ: *LIKE WHAT?*
Matt/I2: *Well, I get more reading books now because I'm in there and I don't forget to take them back like I used to. If you've got to wait for the computers, there's only four, you can have a look around the shelves and stuff. I don't do much homework in there but sometimes I do if I've got lots of time to wait.*

There was one example in this study of a learning resource centre that relied heavily on electronic resources and the book stock was poorly managed and maintained. The young people at this school only use the room for computer access, and used the public library for other resources. When a new system was installed and access to many Internet sites became restricted, including chat rooms, use of the centre fell quite dramatically. Only new year 9 students were keen to use the space out of school hours;

JOHN/I2: *What they've got is, they've got so much money and they spend it on so much technology, but they haven't even got the stuff working as it should be because the staff can't manage it and use it properly. What you've got to do now is, say your in doing a massive project in the morning, it needs to be in for that day and the teacher isn't in yet, what do you do? Your stuck and you can't do anything, what's the point of it all if It's no good, it looks very impressive when you walk in but deep down it's hopeless.*
RQ: *WOULD YOU BE MORE INCLINED TO USE THE BOOKS IN HERE IF YOU HAD ACCESS TO A CATALOGUE?*
JOHN/I2: *Yes, definitely. Like at the central library, its so easy to find everything, all I do is use the microfiche, I know how to use it because my Dad taught me how to use it. I was looking for aviation upstairs in the central library, I pick up the microfiche on that subject, shove it in find it, write down the number of it, maybe a list of five or so on that subject, then I go and find them and I look at them to see what's the best then I take out the ones I want.*
RQ: *SO WHAT IS THE SYSTEM IN HERE THEN, IN THE SCHOOL LIBRARY, IS THERE A CATALOGUE?*
JOHN/I2: *There is but its not complete but what people normally do is look around and get confused. I know what the numbers mean because I learnt it somewhere else.*
RQ: *THE LAST TIME WE TALKED YOU CAME IN HERE EVERY NIGHT AFTER SCHOOL, DO YOU STILL DO THAT?*
JOHN/I2: *Never, no lunch times, no night times, only in the mornings, if I come in early I come in then.*
RQ: *SO WHERE DO YOU DO ALL OF YOUR RESEARCH THEN?*
JOHN/I2: *At home, everything from home and the central library in N…*
RQ: *IS THIS BECAUSE F THE NEW SYSTEM?*
JOHN/I2: *The new system yeah, I can't even be bothered to look in here now I just go straight home.*

One school introduced computers into the library during the course of this research. However the printed material was well maintained, a computer catalogue was made available and study space was increased. In this school use of printed resources and use of study space increased as well as the use of the computer space;

Cath/I2: *The public gets in the way a bit, but the computers are mint, I get lunch passes absolutely loads. I munch down my dinner as quickly as I can and go up on the computers, or just to read a book.*
RQ: *SO YOU GO IN THE LIBRARY EVERY DAY?*
Cath/I2: *Yes, I still enjoy reading the books just as much, but I do go in every day, but not just for the computers.*

Dave/I2: *Well I like reading the books in there as well now, the books more private, on a big screen everyone can see what you're reading, a lot of people take the mick if you read, like you're being a swot and reading and that but if you were just reading a book they can't see what you're reading, its private. When I read a book I turn off to other people and I think it would be harder to do that on a screen because you have to use the mouse and that and that makes you still be part of it.*

7.4.1.2 Discussion of findings

The greatest motivation to use electronic resources identified by this research was that the computer was *fun* to use. This was not only the opinion of the more skilled and frequent users, even those who did express some fear of and lack of knowledge in using new technologies still claimed it was *fun* to use.

Chat rooms and games are by far the most commonly used facility on the Internet by the young people in this study. Those who did not have Internet access cited this as their main reason for wanting access. Those who did have access spent the majority of their time using

chat rooms and playing games. At home they used them every night, at school they set up two or three tasks so they could 'hide' the chat or game if a member of staff was present. In the one school where using chat rooms had been allowed the participants used them every lunchtime and every evening. This school banned the use of chat rooms during the research although some of the participants were still able to gain access. Those who could not get through the new system simply stopped using the Internet.

Frequent chat rooms and game users were also the most capable at searching the Internet and CD-ROM's. The nature of the forum encouraged them to learn about the Internet and gave them confidence to explore. Two schools did allow chat rooms use in modern languages as long as they are used to talk to foreign students in the language they are studying. Both have found it highly successful in relation to the subject but it is also apparent that it is successful in relation to information skills acquisition and motivation to explore the resource. Other areas of this study have indicated that the young people involved find it difficult to learn in the abstract. They need concrete situations in which to learn and those situations need to attract interest. Chat rooms and games, however much they are frowned upon, appear to be capable of doing this. Those school libraries which provide access to EIRs are rapidly becoming 'the place to be' during lunch breaks and after school. This also appeared to encourage use of other resources if those resources were well maintained and well managed.

7.4.2 Purpose

Very often the purpose of the information seeking process impacts on the feelings individuals have towards the task. The purpose of information seeking tends to fall into two broad categories; work or school-related and personal interest.

7.4.2.1 Research findings

- School-related

Frequently the need to complete homework on time and with sufficient information was the most important factor in the information seeking process for these young people. They tended to be satisfied with a number of points that would illustrate their findings and close a search before any in-depth investigation of the subject had actually occurred. This tended to encourage surface learning and this was compounded when teachers requested a specific number of facts relating to the topic;

Annie/O1: *Well, I need to find ten facts about him and I've got ten now so that's enough.*
RQ: *DO YOU THINK THESE ARE THE MOST IMPORTANT FACTS?*
Annie/O1: *I don't know, I don't really care, my homework's done she only asked for ten facts and I've got ten.*

Fred/I1: *Well, especially for History projects, like I've been, I had to find out about the Industrial Revolution lately.*
RQ: *RIGHT, AND WHAT DID YOU GET FROM THERE?*
Fred/I1: *Well there was like about 300 pages of information and pictures and that. I just printed of a couple of pictures and all the main points.*
RQ: *SO HOW DID YOU DECIDE ON THE MAIN POINTS?*
Fred/I1: *Well we've already started the topic at school and she's been telling us, the teachers been telling us like what to look at and that.*
RQ: *WHAT DID YOU THINK OF THE INFORMATION YOU FOUND?*
Fred/I1: *Well it has to be true doesn't it, anyway I just print it off, change the words around and hand it in, as long as I get the homework done.*

Eddie/I1: *Right well, I opened Encarta, I went to 'Find', I typed in what I was looking for, well I just typed in 'Italy' and it'll show you some text and some pictures on 'Italy' and then I highlighted the stuff I needed.*
RQ: *RIGHT, NOW HOW DID YOU GET TO THAT STAGE, DID YOU READ EVERYTHING ON THE SCREEN?*
Eddie/I1: *No, I just looked through the main information that I want to, well that I needed, I highlighted that, copied it and I opened 'Word' and I pasted it in there. Then I got a picture of a map of Italy, I copied that and pasted it into Word as well, then I put it in me own words, then printed it out with bullets, just the main points.*

Gwen/I1: *The Internet, I don't know. I haven't given it much thought, I just think, that's my homework done and that's that. It's on the computer and that's where I got it from so it should be okay. I don't know.*

- Personal interest

When the young people in this study used electronic resources to identify information for personal interest they were prepared to carry out searches in great depth and apply their own judgement to the nature and validity of the information. Karen spent a lot of time researching topics of personal interest and developed a sound understanding of the limitations and possibilities of the Internet. She was then able to transfer this to school related research. Karen had access to the Internet at home and she used that access for personal interest. This type of Internet use is not encouraged by schools because of time and economic restrictions;

RQ: *YOU SAID YOU LOOK FOR STUFF ON YOUR OWN INTERESTS, HAVE YOU LEARNED A LOT ABOUT THE INFORMATION RESOURCE THIS WAY?*
Karen/I1: *Yes, I look for stuff on horses because I want to. I use the Internet and stuff if I do I might look for something on my own, like 'horse' and then you get stuff up and then I find my way around using stuff I want to know about and I like, then I can find the information and know if its true or not because I know it. Then I can change to what I'm actually looking for the lessons and stuff and I find it.*
RQ: *YOU JUST SAID, 'I KNOW IF ITS TRUE OR NOT' HOW DO YOU FEEL ABOUT THE INFORMATION YOU GET FROM THE INTERNET?*
Karen/I1: *Its usually quite trustworthy, but stuff, like American stuff and riding and stuff there's things that they do that you just wouldn't do in this country. It seems wrong that they are putting it on the Internet because, well, when you get off a horse you swing around the back, Americans keep one foot in the stirrup and*

step down. That's dangerous because if the horse pulls away you can get dragged. The Americans always do it that way, so I think that if your looking to start riding and you started that it would be very dangerous.

John demonstrated a similar experience when he was looking for information on Karate School;

John/I2: *I found loads of stuff from other Karate schools and some from just people writing on their own page, some of that was stupid, you could tell they didn't know what they were talking about because they didn't even know the right words to use. I actually like looking at that sort of stuff sometimes because it's really funny, you get a good laugh when you know they are just trying to sound as if they know what they are talking about.*
RQ: *IF YOU DIDN'T KNOW ABOUT THE SUBJECT WOULD YOU STILL BE ABLE TO TELL IT WAS PEOPLE WHO DIDN'T KNOW WHAT THEY WERE TALKING ABOUT?*
John/I2: *Well no, I don't see how I could, I'd just have to believe them, that's why I'm careful about where I go for stuff for here, school. I don't take information from just any Homepage.*

There was also evidence to suggest that searches for personal interest encouraged a deeper understanding of the resource;

Bill/I1: *After my friend had got me started on Encarta I just looked around on my own. I looked for stuff on footballers, there was loads on Pele, I think he was mint. There was a list of famous footballers on the page and you could click on the one you wanted and find out more, you can go back to the first page to choose another footballer. I spent ages doing that.*

As previously mentioned 'chat rooms' were banned in all schools participating in this research by the end of the field work, other than use by language students to communicate with foreign students. Prior to this ban the researcher witnessed the 'chat rooms' behaviour of eight of the participants in the study and what appeared to be a highly confusing and disorientated activity was in fact a well defined and highly structured means of communication. During one observation of Pam she entered into a discussion on a 'chat rooms.' She established and maintained a chat in the main room and four private conversations in 'side rooms' completely independent of the main conversation and each other. The researcher by this point found it very difficult to keep track of the conversations, Pam however showed no sign of losing track of any of the conversations and was able to 'jump' from one to another rapidly and confidently;

RQ: *SO WHAT ARE YOU DOING NOW?*
Pam/O2: *Well I was talking to everyone in the main chat room but now this person I've been talking to for a few weeks has come on, I'm going off to talk to them in private, like in a side room.*
RQ: *SO YOU'RE LEAVING THE CHAT IN THE FIRST ROOM?*
Pam/O2: *No, I'm still talking to them but I'm having this private chat as well, see I can talk to both of them, well, all of them at the same time. I just have to move from the private room back into the main room like that, just keep jumping between them.*

Pam/O2: *It's private and its your own individual work and you don't have to share it so you don't have to like compromise on everything, you can do it the way you want it. You can do your work, you can do two things at once as well, because you can just minimise it and put something else up and you can keep changing.*
RQ: *SO WHAT WOULD YOU HAVE GOING AT THE SAME TIME THEN?*

Pam/O2: *I usually have a chat rooms and English work, proper school work and then something I shouldn't really be doing but its fun anyway.*
RQ: *SO YOU CAN JUST CLICK ON THAT IF SOMEONE WALKS PAST?*
Pam/O2: *Yeah. But they're starting to suss that one out now. The more you put up though the slower the computer gets, so after a while its better to stay on about two, even then it still slows it down quite a bit.*

7.4.2.2 Discussion of findings

A number of the participants in this study were high achievers and could describe what they regarded as 'good' research. The evidence appeared to indicate that it was personal interest which stimulated in-depth, structured research. When it came to school-related information seeking they appeared to be content with accumulating sufficient detail to fulfil the homework criteria and tended to terminate the research process long before they had achieved any deep understanding of the topic. There was no evidence from the comments they had received on these pieces of work that there was any attempt to discourage this by teachers. The use of highlighted keywords in CD-ROM databases encourages this type of behaviour as it is possible to locate a term or word without having to engage in any background reading. It is now possible for them to locate a resource, identify their topic and extract the minimum of relevant information without engaging in any selection process. There is a danger that this would encourage surface learning. It would also suggest that tasks set in a traditional information environment need to be rethought and adapted or changed to accommodate changes in the way information is offered and located.

Personal interest appeared to encourage more extensive research and a deeper understanding of the nature of the resource itself. Those with home access spent a great deal of time familiarising themselves with CD-ROM's and the Internet, making discoveries about both the topic and the resource without actually engaging in any formal, structured learning. They also appeared to retain this knowledge and apply it during subsequent searches. This would support evidence from past research that people want to learn by doing.[Carroll, 1997] In particular they want to learn, and tend to retain more of that learning, by doing something which is of particular personal interest to them. As school and public library access is usually restricted this would suggest that this places those with no home access at a disadvantage when it comes to developing their search skills and becoming familiar with the nature of the resource.

Schools actively discouraged the use of 'chat rooms' because they are generally associated with 'time wasting' and 'recreational activity'. The unregulated nature of the majority of 'chat rooms' was an area of considerable concern. Yet it does appear that the use of these forums does encourage use and does develop navigational skills. What appears at first glance to be trivial use of the resource demonstrates the need to develop high order cognitive skills. It became clear during the observation described earlier that Pam had developed a clear understanding of navigating this complex environment whilst remaining aware of the subject of each conversation and she was confident with the technology. If schools retain the blanket ban on this resource they could be sacrificing a valuable learning tool that not only encourages use but also contributes to skills acquisition and reflective practice. There appears to be an issue between 'recreational' use and 'work' use, however 'recreational' use has a role to play in training and transference of skills.

7.4.3 Location of use

There were three *typical* locations that provided access to EIRs identified by this study; home, school and the public library. None of the young people in this study had ever used *Internet Cafes* or any other access point. There was only one *Café* within relatively easy access of all participants but even this would mean a long bus journey and many parents would not allow their children to take this trip.

7.4.3.1 Research Findings

In this study, nine of the sixteen young people involved in the research had computer access in the home. Of these four had access to one PC shared with the rest of the household. Two had the one family PC in their bedroom with primary access, two had their own PC plus access to a shared PC and a laptop, and one had access to a PC at the home of her Grandparents, where she spent the majority of her time. The remaining seven young people had no access to a computer outside of school or the public library. All of participants who had home access preferred this to any other location;

RQ: *WHERE DO YOU PREFER TO USE THE PC?*
Annie/I1: *At home, because you can learn to do more things without people telling you to do this and do that. It better because you don't get to do as much at school with the computers.*

Bill/I1: *Just you feel more at home when you have a look at stuff and that. You're not like in public and stuff, its more comfortable.*
RQ: *SO WHEN YOU USE IT IN SCHOOL IS THERE A GROUP OF YOU THEN?*
Bill/I1 *No, you like take turns on it, and then somebody else goes on after us.*

RQ: *YOU'VE TOLD ME YOU WORK AT HOME USING A COMPUTER AND BOOKS, AND YOU DO BOTH AT SCHOOL, SO WHERE DO YOU PREFER?*
Helen/I1: *At home.*
RQ: *WHY?*
Helen/I1: *Because you can just relax at home and go when you want.*

Ruth/I1: *Yeah, I've got lots of computers at home, I've got an N64, a Commodore 64, an Amega, a Mega-drive and a PC CD ROM.*
RQ: *SO DO YOU SPEND A LOT OF TIME ON THEM THEN?*
Ruth/I1: *Yeah, it's better than at school, in here.*
RQ: *WHY IS THAT?*
Ruth/I1: *Because it's better at home, nobody to tell you what to do all of the time and that, it's in your own time at your own pace, I know I won't get kicked off before I'm finished. Because you can only stay here until five o'clock so its just easier to go home and work for ages than having to go about everywhere.*

Annie/I2: *I prefer to use the Internet and CD's at home, but I like working on the network, on somebody else's password because I haven't got access yet, at school because if you find something you can tell other people to find theirs or they can help you. I still prefer working at home but I like the network at school much more than I did.*
RQ: *SO YOU USE THE EMAIL, DO YOU USE IT AT SCHOOL YET?*
Cath/I2: *Yes, I've been on it once but usually I use it at home, it's just better in private and not having a time limit on it.*

Not having access to a computer at home was seen by all of the participants in this study as a great disadvantage, those who did not have home access felt they were missing out and those who did could not imagine being without their PC;

Eddie/I1: *I feel really sorry for my mates who haven't got a computer at home, they have to use the school ones all of the time and they never really get a chance to find out what they can really do. You can do much more at home and they listen to us talking about our homepages and stuff but they don't understand what's going on. One of my mates comes to my house a few night a week but it's not the same.*

Ian/I1: *Well you can't get Encarta or anything on the Amega. It would just be really useful, you could get the Internet and work from home and stuff.*

Lee/I1: *I think they could like take a lesson a month to show us how, because some people don't have computers at home and they sometimes have to ask other people how to get to a certain place or something like that. So I think they could use like a lesson a month, like the student guidance sessions sometimes to like teach people to use the Internet and Encarta and other programs.*

Ian/I2: *They think its good that I use it, but now I've decided I want a PC at home and I'm always going on about it, they don't like that. I've been getting money instead of presents but I want a CD player first.*
RQ: *DO YOU REALLY THINK YOU NEED ONE AT HOME?*
Ian/I2: *Yes, because sometimes we get work that has to be word processed and I can only do it here, this stuff doesn't work all of the time so I could do it at home, it would be better.*

7.4.3.2 Discussion of findings

The location of electronic resource access impacts on the users feeling towards both the technology and the information. The location of access was of great significance to these young people, there was strong evidence to suggest that home was the preferred location.

They felt more comfortable using these resources at home because of the privacy this allows and the scope for increased access time. This also leads to those without home access feeling disadvantaged from the outset, there was evidence to support that this was the case. However, even if lack of home access was not a disadvantage, the perception that it was could be sufficient to contribute to negative feelings. They feel unable to compete on even terms with, what they saw as, their more privileged classmates and this contributes to a lack of confidence and an unwillingness to experiment with the technology.

Young people learn more when they are comfortable, relaxed and confident about their environment, the schools in this study do not appear to be creating this environment in relation to electronic information resource provision.

7.4.4 User expectations and systems capabilities

Other research has identified that there is often a discrepancy between the end user's expectations of the software and its ability, or inability to meet these expectations [Yang, 1997]. Evidence from this research shows that this was also a problem for the young people in this study.

7.4.4.1 Research findings

John, referred to by many of his colleagues as a 'nerd', a 'techie-head' and 'digi-man', frequently advised other users and often gave impromptu training sessions in the library. Yet during one interview he discussed the feelings he experiences during an Internet search as;

John/I1: *It's such a pain, I know it's there but it takes so long, , I get fed up of it. Sometimes I just give up, I know it's doing a lot of work but that doesn't help me when I'm sitting here waiting for it. You start to wonder what you've done wrong and if I have to go back and do it again I'd rather not bother.*

An observation of Pam revealed how frustrating it could get for the user who has been led to believe that the Internet provides instant, 'easy' access to information. During the following dialogue the information on the screen was telling her that the site had been found and she was waiting for a connection, it did not appear to get her attention at all.;

Pam/O1: *You see what I mean, what's it doing? Nothing is happening. I know there's something on that because I did it the other day when I was in here at lunch time, this gets me really mad. Oh let's look for something else, I'm not waiting for this.*

Ian, who used the Internet and CD-ROM's frequently, referred to how annoying it was when the system did not match up to his ideal;

Ian/I1: *It's a bit annoying because when there's lots of people then the network's got more demand on it so it goes really slowly, it took twenty minutes to open my email once, I didn't even have time to answer any, which was annoying and I get really stressed out.*

7.4.4.2 Discussion of findings

This research has confirmed that there is a problem created by a discrepancy between the users' expectations of what the software can do and the software's ability, or inability to meet these expectations. The participants in this research all referred to the length of time they had to dedicate to a search and the proportion of that time they spent waiting for something to happen as being their greatest cause of frustration. Some were able to deal with this by employing various coping strategies, but all agreed that it was a cause of considerable concern. This created a great deal of tension that was compounded by uncertainty concerning the accuracy of their search.

John knew that his search was carried out correctly but very often the system forced him to doubt himself and become anxious. This is the experience of a frequent user who was aware of the process being carried out by the technology yet he still experienced self doubt and frustration. These feelings are even more evident in the participants who had no concept of what is happening while they waited.

John's response was quite typical. End users have high expectations of what technology can do for them, and when these expectations are frequently not met they become frustrated with themselves and the system. This situation was made worse by the limited amount of time students are allowed to spend on these resources. Out of school hours they had to pay for access at one location, but even when they are given free access to the Internet, CD-ROM's and online databases they are constantly aware of the length of time they spend, often highly unsuccessfully.

7.4.5 Self-concepts

How people see themselves has an impact on how they feel and behave in all social settings. Self-concepts are influenced by a 'persons beliefs about their own efficacy' [Bandura, 1992, p.3]. Research shows 'that a strong sense of personal efficacy is related to better health, higher achievement, and better social integration.' [Schwarzer, 1992. p.viii] Self-efficacy is

the belief a person has in her / his own ability to take control of a situation, and this belief can lead to higher levels of self-esteem. The negative aspect of self-concept is the theory of 'learned helplessness' which occurs when individuals experience a series of demoralising or unpleasant events. [Abramson, Seligman & Teasdale, 1978] Although notions of self-concepts belong primarily in the affective domain of learning, they also impact in cognitive areas in the application of knowledge. The impact of feelings has been discussed earlier in this chapter in relation to cognitive issues.

7.4.5.1 Research findings.

This research has identified that use of EIRs impacts on an individual's self-concepts in two areas; the emotional impact of *self-efficacy beliefs* on future performance and the impact of *learned helplessness* on future performance.

- Self-efficacy beliefs

Two participants in this study had high levels of self-efficacy in relation to electronic information use, both were confident users of electronic resources and regularly carried out successful searches;

Eddie/I2: *I know pretty much everything about my computer and how it works, I know how to put things right most of the time but if I don't I can always figure it out one way or another.*

John/I2: *I built the computer I've got now by myself, I ordered all the parts so I could be sure to get the good stuff and I put it together myself, not the monitor, I bought a keypad, a monitor and a hard box then just went from there. Once you've done that there's not much else you can't figure out.*
RQ: *BUT WHAT ABOUT ACTUALLY USING THE RESOURCES YOU HAVE ACCESS TO, THAT'S A BIT DIFFERENT FROM BUILDING THE COMPUTER ISN'T IT?*
John/I2: *Oh yeah, I'm just saying that I can usually figure things out if I have to, I understand how it works and there's not a lot that really fazes me.*

The majority of participants did not have this belief in the levels of personal control they had over their use of EIRs;

Gwen/I2: *I don't really understand how to use the CD ROM, I'm frightened that if I click something it's bound to be wrong and I wouldn't know how to put it right. I just don't bother much that way I can't get into too much trouble.*

Gwen/O2: *I told you I didn't understand how this thing worked, they said the CD was on the network or something but I don't know what that means, I put the CD in there at my Grans' house but we never see the CD here.*

Helen/I2: *I'm really stupid most of the time, you know, pressing the wrong thing and never really knowing why I did it.*

Helen/O2: *That's the icon for Encarta, click on that and you get straight in, I know how to do that but I had to ask, I think other people just manage to figure it out for themselves, I don't.*

Nicola/I2: *I don't think I understand it well enough, you know, like what does what, half the time I click on things and I'm not sure why.*

Nicola/O2: *Oh I don't understand this, why can't I get Encarta on? I know it's on the network but I don't ever manage to do the right thing, I spend ages like this, just clicking all over the place until something useful happens.*

- Learned helplessness

There was evidence in this research to suggest that learned helplessness does have an impact on the role of access to EIRs on learning opportunities;

Ian/I2: *It's [*Grolier's Encyclopaedia*] a bit too hard for me to use, I've given up with it now, my mate K… tried to show me how to do it and I'm sure I copied him properly but I still couldn't get the stuff I wanted so why bother?*
RQ: *WHAT ABOUT TRYING IT AGAIN?*
Ian/I2: *No chance, I can't use it I'm no good on it so what's the point, I'll stick with what I know but I feel pretty stupid especially when K… asks me why I never go on it.*

Dave/I2: *I never the use the email, I tried to look at it the last time when you said you had sent me a message but I couldn't. I've tried loads of times, I've even asked the Librarian but it just doesn't make much sense to me and I felt a bit of a prat when everyone else was sending messages. I just don't mention it anymore because I'm not going to ask again.*

Bill/O3: *No, I've never used Altavista for ages, I tried it when we first got access to the Internet in school, I tried it loads of times but I could never understand the 'Advanced Search' thing, I was supposed to use other words as well as the words I was looking for but I couldn't figure them out. No, I can't make that one work for me so I just use Yahoo all of the time now.*

Nicola/O3: *Well you saw what a mess I made the last time, can we not use something else do you think?*
Researcher: *WELL WHY NOT TRY IT* [Encarta] *AGAIN?*
Nicola/O3: *What for? I can't do it. Unless you want to see me make a fool of myself again. No, I'm going on the Internet, I usually find stuff on there even if there is too much.*

Gwen was particularly susceptible to learned helplessness, she had experience of this in other areas of school work;

Gwen/I1: *I'm hopeless at maths, I can never get it right and I just get all flustered when I have to try and work out equations and stuff, I dread it when you know the teacher is going to ask you to do something in front of the class, they all know I'm thick at maths. It's the same with all this stuff on the CD ROM, you know Encarta, I just don't get it, I try but there's nothing I can do to get to see how it works, my brain won't take it in. I have to go to maths lessons but I don't have to go on the CD so I don't unless I'm with my friend.*

7.4.5.2 Discussion of research findings.

> 'Humans have a basic psychological need to be effective in their interactions with the world. This desire has been labelled the need for effectance or for competence.' [Skinner, 1992. P.91]

Self-concepts have an important role to play in the learning process, other research has identified the significance of how people feel about themselves and how they are perceived by others on their ability to assimilate knew knowledge. This research has identified learned helplessness in other groups of variables but it is of sufficient significance to stand in its own right. As previously discussed, individuals tend to assimilate new knowledge with

knowledge already stored, if that new knowledge reaffirms suspected beliefs concerning the individual's ability, then those beliefs become reality for that individual.

7.5 Social variables

This research has identified a number of social variables which influence how access to EIRs can impact on learning opportunities. *Economic factors*, which not only determine access to electronic resources in the home, but under current policies also determine access in school and public libraries. *Peer interaction* specifically within the electronic information environment and the impact this has on other areas of interaction. This also includes issues relating to *gender* which appear to be present in the use of these resources.

7.5.1 Economic factors

Economic factors, which influence the use of EIRs, include both the cost of computer equipment and the cost of training in the use that equipment effectively.

7.5.1.1 Research findings.

- Computer equipment.

All of the young people in this study who did not have access to a computer at home claimed the reason was affordability, all would have like a computer but their families were not in a financial position to make such a purchase;

RQ: *YOU DON'T HAVE A COMPUTER AT HOME DO YOU?*
Dave/I1: *No, we can't get one just yet, maybe for Christmas my Dad says but they are really expensive I think.*

RQ: *DO YOU HAVE A COMPUTER AT HOME?*
Gwen/I1: *No, my Mam can't afford it but I use one at my Grandma's house.*

RQ: *YOU DON'T HAVE ACCESS TO A COMPUTER AT HOME DO YOU?*
Ian/I1: *No, I've got an Amega game console but I want a PC, I keep trying to save up for one but it costs so much that it would take me forever. I keep hinting on to my Dad but I isn't taking much notice, I he says we can't afford one.*

RQ: YOU DON'T HAVE A COMPUTER AT HOME DO YOU?
Lee/I1*: No, I really want one but there's a few of us at home and my parents can't really afford one, I think we might get one for Christmas but I'm not sure.*

RQ: *RIGHT, DO YOU HAVE A PC AT HOME?*
Nicola/I1: *No, I want one. So does me Mam like but we can't afford one.*

RQ: *THERE'S NOT A COMPUTERS AT HOME?*
Pam/I1: *No, I live with my Mam and she can't really afford stuff like that, I would love one but I wouldn't ask because she would worry about it and feel as if she had to try and get one.*

- Access to resources.

The cost of individual CD-ROMs and Internet access was an issue for both those who had home access to a computer and those who did not. Those who did not have home access also claimed that it would be difficult to afford the software even if they could afford the computer. Some of those who did have home access also felt that the cost of individual software and the cost of Internet access was a disadvantage;

RQ: *DO YOU KNOW IF YOU HAVE ACCESS IN THE PUBLIC LIBRARY?*
John/I1: *Oh yeah I do. N… Library. You have to pay about a pound for five minutes though, so its expensive.*
RQ: *REALLY, SO HAVE YOU EVER BEEN IN AND TRIED IT?*
John/I1: *No, I don't really want to, its better here because it's free.*

RQ: *DO YOU GO ON THE INTERNET AT HOME?*
Matt/I1: *No, it would cost too much in phone bills my Dad says, I would be careful but he says I would spend all of my time on it and he couldn't pay the bill.*

RQ: SO TELL ME WHAT DO YOU DO ON YOUR COMPUTER AT HOME?
Helen/I2: *I do all my homework you know, word processing and that. I sometimes try and use the maths thing, you know, the one with all the boxes in that adds up for you. I can't use that very well but I've had a go on it a few times, mostly it's just word processing for homework. I want to go on the Internet but my parents said I can't because it costs too much money. I go on Encarta, we got that for Christmas but CD-ROM's are really expensive so we haven't got many.*

One school was piloting a scheme to allow access to the school Intranet from home, they provided the modem but the families were responsible for the charges. One of the participants in this study was involved in the pilot but when asked if he thought it would become common practice he was somewhat sceptical. The cost of access rarely ends with individual purchasing of a resource, cost is ongoing and often impractical for many families;

John/I1: *If they were interested and could see that it would be an advantage to them instead of just a gimmick, if they thought it was actually going to help them then they probably would. But then some parents might not be able to afford the phone bills and all that.*

- Training

John was the only participant in this study to have had any training outside of school;
John/I1: *I used to go to N… College on a Saturday morning, its like a junior college course where like, for kids from 9 to 12 could learn how to use computers and that, all different subjects. I used to go to use the computers and that.*
RQ: *AND THAT WAS A SATURDAY?*
John/I1: *Yeah, a Saturday morning. It was from 10 until 12.15pm like two and a quarter hours. And they had like a tutor there.*
RQ: *AND WAS THAT FREE?*
John/I1: *It was £15 for a course, that was five weeks, five Saturdays, so it was quite good yeah, it worked out £2 a time, it was really good. I'm starting a new course next year.*
RQ: *IS THAT AT N… COLLEGE AS WELL?*
John/I1: *Yeah, Saturday mornings, 9 until 12.15pm so like its three hours.*
RQ: *SO WHAT AGE ARE THEY FOR?*
John/I1: *16 + but I got special permission.*
RQ: *HOW DID YOU MANAGE THAT?*

John/I1: *The tutor who used to take us, he knew that I was interested and all that so he says, what I had to do was I had to get permission from the Head teacher at my school, I had to get permission from the Principal at the college, then he gave me it so then I could go on it.*
RQ: *AND DO YOU HAVE TO PAY FOR THOSE COURSES?*
John/I1: *Yeah, it's about £30, but my Dad doesn't mind, its good.*

7.5.1.2 Discussion of research findings

Economic factors relate to the ability 'to afford the necessary computer equipment and the training to use it.' [Connell & Franklin, 1994, p.614] If this equipment and training are not available equitably in schools and public libraries then levels of access become dependent upon the financial status of individuals.

In her extensive review of research carried out into computer access in schools Sutton [1991] found that 'poor and minority children had less access to computers both at home and at school.' [p.479] This research can support claims that young people from poorer homes do have less access to EIRs not only in the home but also in public libraries and in school. As long as current policies on charging for access continue these young people will continue to be disadvantaged in both physical access to these resources and the ability to maximise any learning opportunities that may be provided by this access. Recent Government initiatives appear to have recognised this issue, they have recently announced 'a £15 million scheme to provide recycled computers to children and adults from low income backgrounds, in areas identified in the Excellence in Cities initiative. Individuals and families will be expected to make modest monthly payments towards the costs.' [Johnston, 1999, p.8] Although this is recognition of the issue there are still economic factors which inhibit use of individual electronic resources that could be addressed by schools and public libraries in terms of their charging policies. John was conscious of the cost of telephone charges. This is an issue which still prevails when decisions are made about purchasing within individual families.

7.5.2 Peer interaction

Peer interaction includes both tutoring and collaboration. This research suggests that peer tutoring and collaboration takes place at all stages of the information seeking process, from acquisition of *technical skills* and *information skills* to the *information use* stage. There is also evidence to suggest that this interaction was actively discouraged in all educational sites visited in this research. *Discouraging peer interaction* appeared to be common practice in

all schools and public libraries where observations were carried out during the fieldwork for this study.

7.5.2.1 Research findings

- Technical skills

Gwen, a low achiever in all subjects, had never tried to use Encarta and was not confident in attempting anything *new*. After our first interview and during a subsequent observation, her friend showed her how to open Encarta and how to copy and paste material from there to her own document;

Gwen/I2: *I don't know, my friend told me how to get on Encarta.*
RQ: *SO HOW DID YOUR FRIEND SHOW YOU? DID SHE SIT WITH YOU?*
Gwen/I2: *Yeah, I got in to the computer first and then she told me how to do it. I think its got on the bottom 'go to next page' just do that when you want to go to another page, you just type something in then it was like loads of information and I just picked bits out that I needed to know.*
RQ: *DO YOU LIKE WORKING WITH YOUR FRIEND?*
Gwen/I2: *Yeah, I think that's good because we share ideas and that and you learn, at least I do.*

During the observation Gwen asked for instructions constantly, instructions which her friend gave her willingly and which were pitched at a level Gwen could cope with and internalise. By the penultimate observation she was accessing Encarta and retrieving relevant information, although she did need her friend to be present. After the tutorial session given by the friend the researcher asked the friend if she minded spending so much time helping Gwen, she responded by saying; '*No, it's good fun and I'm not good at much so when I am it feels great.'* It would appear that this tutoring had benefited both Gwen and her friend. There were many examples in this study of successful peer tutoring;

Eddie/I1: *I showed my mate how to write his homepage, we spent ages on it, I usually go around to his house because my Dad uses our computer a lot. You don't get shown that sort of stuff at school because it isn't really school stuff is it. I showed him how to find other stuff on the Internet because he hadn't used it before.*
RQ: *DO YOU MIND HAVING TO SPEND SO MUCH TIME HELPING HIM?*
Eddie/I1: *No, I learn something new a lot of the time as well, it's good fun anyway because it feels like I've got something to show him, you know, like I know something he doesn't.*

Helen/I1: *Well, we got the computer for Christmas and my sister had already been on it at school, and I was still in my Junior school, so she just told me like, if I wanted to find something quick I just clicked on 'Wizard' and typed what I wanted and then it would tell me.*

RQ: *SO HOW DID YOU FIND OUT HOW TO DO IT?*
Ian/I1: *Well the people in charge of this place, the library, they are always too busy fixing the machines, they don't show you how to do stuff. I think Karl showed me, somebody showed me. Somebody said have you got an email address and I sort of went, what? I didn't know what it was I just thought oh, I can have an email address.*

Pam/I1: *The lads in my group showed me how to use the computers, you know, Encarta and the Internet, I found out most of it in lunch times and after school, it's easier when they show you because they know I don't know much about it.*

Peer collaboration also played a significant role in electronic information use, many of the male participants in this study would work together with friends on technical problems to reach solutions to both school related and personal projects;

Ian/I2: *About five of us got together to do homepages, we all wanted our own but we figured it out together, that way you get the best from everybody, as long as you all know a little bit, well in my case a very little bit.*

John/I2: *I built my own computer, you know, I got all the bits from mail order, just a cheap box but the sound card was the best and I put loads of memory in. It worked out cheaper that way and it's great to build your own. Three of us worked on it and now the other two are going to do the same thing. Now we've worked it out it will be easier next time.*

Lee/I2: *Me and some other lads worked out how to fix up Steve's computer, he didn't have a clue but we managed in the end. His Dad wanted to help but he just kept telling us what to do and saying as how he was wrong most of the time we gave up and came back when he was at work.*

- Information skills

The acquisition of information skills appeared to be enhanced by peer interaction, but there was evidence to suggest that collaboration was of a greater significance than tutoring;

Cath/I1: *I like going on the Internet with my friend, we have a good look around and try out different ways to find stuff.*

Karen/I1: *I like working in the library, I find it quite easy because its not, well there's supposed to be silence but there isn't and then you can like talk to your friends and work it out with someone else. When I go on the Internet at home it's more boring and I never find as much, we all have something to say and some move to try.*

Gwen/O2: *I don't think we're supposed to do it together, but we like look for the information together, and write it up separately.*

Nicola/O2: *It's better when I go on with Katie, we have a good laugh trying to find the answers and I don't feel as stupid when we both keep getting loads of hits. We always find something but it never to take as long as this.*
RQ: *HOW LONG DO YOU USUALLY SPEND ON HERE WITH KATIE?*
Nicola/O2: *All lunch time usually, well it must take longer then because we haven't been in here that long. Well it doesn't seem as long, sorry no offence but you're not supposed to be here really are you, like you don't do the work with me you just watch.*

During an observation Cath was very keen to show something she had recently discovered on the Altavista search engine;

Cath/O1: *Look at this, me and my brother found this last week, if I go to 'Advanced Search' I can put 'and' in the box and it only gives me stuff with both words in, that's great isn't it? I don't get as many sites that way, did you know about that? You can put other words in to change the search but we haven't done that yet, I'll try it next time.*

RQ: *DO YOU ENJOY PASSING ON THE KNOWLEDGE YOU'VE GOT TO OTHER PEOPLE?*
John/I1:*Yeah.*

RQ: *WHAT DO YOU ENJOY ABOUT THAT?*
John/I1: *It's so they know how to do it by themselves, they keep asking you loads of times, saying how do you do this, how do you do that, if you do it straight away for them they don't know how to do it, then they keep going back asking you, so if you tell them how to do it, they can do it by themselves. Get straight on to it without being stuck.*

During the fieldwork Pam had conducted a search on volcanoes, she had located a vast quantity of information but was unable to decide what was of use to her and what was not. She attempted this search again with Ian, another participant in the research. They had managed to narrow this search down using standard search procedure they had worked out for themselves during another search on photosynthesis. Pam was so keen to demonstrate this that an additional observation was set up to allow the researcher to witness her newly acquired skill.

- Information use

The young people in this study demonstrated their willingness to share information located on and retrieved from, the computer;

Lee/I1: *Sometimes you work alone because, we didn't all have to do vivisection, you just had to do a leaflet about animal rights and we went up in groups of who chose what, because some of my mates chose hunting and they went on at a different time to me. So like they could share information with other people doing your topic and like share web sites and stuff.*
RQ: *WOULD YOU DO THAT WITH BOOKS?*
Lee/I1: *No.*
RQ: *WHY?*
Lee/I1: *Because the stuff on the web is for everyone, like it's just there it's open to everyone to use and we just pass it around.*
RQ: *ISN'T IT THE SAME WITH A BOOK THOUGH, THAT'S WRITTEN DOWN FOR EVERYONE TO READ?*
Lee/I1: *No because you have to go and get that from the shelves and read it for yourself, it's sort of private.*

Fred/I1: *Well one we had to do on computer so we all used the same font and the same text and everything, so it all looked the same then we just printed it off and put it together. We all cut and pasted different bits of the information then read it and decided what each of us would use, we did that on our own so they weren't all the same.*

Helen/I1: *It's all right, its not hard. If anybody had any major problems, like they didn't have a CD-ROM, they'd just tell us and we'd let them come to one of our houses to get the information or something like that, or go to the library and work together in there.*

Karen/I1: *We were doing it for history that time but either really, sometimes in pairs swapping information and stuff and if you can't find something ask someone else and see if they've got it.*

- Discouraging peer interaction

Peer tutoring and collaboration does not appear to be encouraged in any of the sites used in this study. All of the learning resource centres had a policy of one person to each computer and did not encourage resource sharing;

RQ: *AND DOES NOBODY MIND YOU WORKING IN GROUPS?*

Ruth/I1: *They do mind sometimes if you just sit around talking so its best to get two computers near each other because if you like go and talk to them they'll shout at you until you get back to your seat, it doesn't matter that your asking for help or something they just tell you to shut up and go and sit down.*
RQ: *SO YOU DON'T SIT AT THE SAME PC?*
Ruth/I1: *No, its just one to a computer in here.*

Bill/I2: *We aren't allowed to sit at the same computer, it's just one person per space and if you go over to your mates you get thrown out.*

Helen/I2: *We all have sit on our own in the library, if we don't I think we get thrown out, I'm not sure because I haven't tried, I just work with my friends at home. But other people have been in trouble because they tried to sit together, it's a bit mean really because some people don't know how to use all of the stuff on their own.*

Nicola/I2: *We sometimes sit on the computers by the desk but the librarian can see you from their so you have to try and get two computers next to each other and just whisper when nobody's looking. Sometimes, when I get stuck I wheel my chair over to my friend so I can see what she's doing but I always get caught and it's dead embarrassing to get told off in front of everyone.*

7.5.2.2 Discussion of research findings

Research has shown that peer interaction, in the form of collaboration and instruction, have a significant role to play in learning opportunities for young people. Vygotsky claimed that social interaction was the foundation of developing new mental processes and attaining a higher mental level [Wertsch, 1981]. The important element here is the concept of *social interaction*. It could be argued that teacher-pupil interactions also involve a social perspective. However, the typical framework for teacher-pupil interaction is the giving of instruction by the teacher and the response to that instruction from the pupil, with the limited possibility of these roles ever being reversed. Peer interaction removes the element of rigidity present in the teacher-pupil relationship and provides opportunities for peers to constantly switch from teacher to pupil and pupil to teacher [Forman & Cazden, 1985]. The young people in this research frequently reversed roles, *experts* were identified and allowed to pass on their knowledge to their peers. This also appeared to raise levels of personal self-esteem amongst those being asked to share their knowledge. The use of EIRs appears to encourage peer interaction to a greater extent than information seeking in other environments. All of the young people in this study, with the exception of John, a highly skilled user who had taken courses at the local college, used friends to develop their understanding of the technology. They relied heavily on their friends and classroom acquaintances to offer guidance in the use of these resources. This peer tutoring and collaboration appears to take place at all stages of the information seeking process, from acquisition of technical skills and information skills to the information use stage.

This study revealed development over an observable time period [microgenesis] in those participants who had benefited from peer tutoring. During the course of the field work four participants who had very limited knowledge of the technical skills necessary to operate both CD ROM's and the Internet had been taught by friends how to access Encarta from the school network and how to set up their own email address.

Peer tutoring does appear to be present during information skills acquisition although this study indicates that it is peer collaboration which has the greatest influence on information seeking behaviour. There could be a number of reasons for this but it is suggested here that because all of the participants were relative beginners in using these resources there were no established experts and they all appeared to be learning together for the majority of the time. These young people appeared to be capable of internalising a great deal of information when they worked together to reach a solution to a search problem. Often, one *real* episode was sufficient to teach a more advanced search skill.

The young people in this research revealed a definite willingness to use information located by others and to pass on information they had identified without feeling as if they had given up anything precious to them. Many of the participants used this as a means of demonstrating that they were able to locate information using electronic resources, an ability that has considerable standing amongst their peer groups. This pride in their ability and urge to demonstrate their skills did not appear to be present in the location and use of print based material.

> ' the Vygotskian perspective enables us to see that collaborative tasks requiring data generation, planning, and management can provide another set of valuable experiences for children.' [Forman & Cazden, 1985. p.343]

The teachers and librarians in this study did not encourage sharing, when asked about this the reason usually given in all locations was that sharing computers encouraged talking and this usually led to '*messing about'* and '*no work getting done'*. This was in huge contrast to events witnessed by the researcher, a great deal of work did in fact get done when these young people were together. There is no doubt that they talked a lot and often laughed out loud when they made mistakes or located amusing or irrelevant information. They also became quite exuberant when they made unexpected discoveries, but they were learning a great deal about the resource, the information and the topic.

7.5.3 Gender

This study identified issues of electronic information use that appeared to be directly linked to gender and concerned with technical understanding and interest, and resources use.

7.5.3.1 Research findings

The issues related to gender which were identified by this research were concentrated in three areas, *technical understanding* of the medium, *interest* in the medium for its own sake, and the *use of the resource,* in terms of motivation to use the resource and the purpose of that use.

- Technical understanding and interest

There was evidence to suggest that the male participants in this study were very interested in how the technology worked. They devoted a considerable amount of their own time to learning about the hardware and system design;

Ian/I1: *We do about computers in technology but they don't tell you enough, you know, all the things about how they work and that. I got loads of stuff from the Internet about different computer systems and I read all of that, I wish we could learn more about that side of it, not just about using Word and that, but that as well, I like that.*

John/I1: *I used to go to N… T… College on a Saturday morning, its like a junior college course where like, for kids from 9 to 12 could learn how to use computers and that, all different subjects. I used to go to use the computers and that. It was £15 for a course, that was five weeks, five Saturdays, so it was quite good yeah. It worked out £2 a time, it was really good. I learned everything about computers there, how to use different stuff, how to use computers for yourself basically, and they had the Internet there, Internet access and there was always a tutor there who actually took the class, there was about say 15 people in the class, and the tutor was really helpful. He was like, he worked there as a technician and he showed me everything that I know, he taught me that. It was really good.*
RQ: *SO WHEN DID YOU DO THAT?*
John/I1: *I started when I was 9 and I finished when I was 12, so I went there all through all the years.*
RQ: *IT WAS A FIVE WEEK COURSE AND YOU WENT BACK?*
John/I1: *Yeah, it was about say, in a year there was about, say you had five weeks then you might have rested for a couple of weeks then you start again on the next time. You were always learning a little bit more every time and I preferred that. When it very first started it was quite busy, but now its absolutely packed, you have to, as soon as the forms come out you've got to put your name down straight away because the places get zipped up that morning, you might have some left over the next day, but very little.*
RQ: *YOUR TOO OLD FOR THESE NOW THEN?*
John/I1: *Yeah, but I'm moving to the adult courses. I've been on three up to now. Saturday mornings, 9 until 12.15pm so like its three hours. There for 16 and over but I got special permission. The tutor who used to take us, he knew that I was interested and all that so he says, what I had to do was I had to get permission from the Head teacher at my school, I had to get permission from the Principle at the college, then he gave me it so then I could go on it. Its about £30, but me Dad doesn't mind, its good.*

Lee/I1: *I like IT the best, we do loads of stuff on all different computer programs and we learn about how the computer does things, I wish we did more on them, I've been reading some stuff from the library. I go home and try stuff out on my computer to see if I understand it properly. They don't tell us enough about how stuff works, you know, how all the different pieces fit together, how the machine runs and the programs work. That's what I'm reading about now.*

The females in this study did not demonstrate any interest in the technical aspects of computers, they regarded them as a tool, a means to an end, not as an end in themselves;

Pam/I1: *I haven't got a clue how it all works, some of them do, you know, they spend hours just figuring out how it all works but that's because they're techno's. I'm not, I like the Internet but I don't care what's going on inside.*

When asked if it ever worried her that she had no idea about the way the information got to her she replied; *'Why should I, it's just like a book, you know, you want something so you go and find it, it's just there, only it's easier on the Internet. I did fancy writing a web page last term but I never had time, I suppose if I wanted to do that I'd have to learn about it.'*

Karen/I1: *I ran out of memory once, I was trying to get this picture and there wasn't enough memory, I told my Dad and he sorted it out, I haven't a clue what he did, I would just ask him if I needed anything done, I'm not really bothered about it.*

- Resource use

There appeared to be significant differences in the use of resources between males and females in this study, quotes used earlier demonstrated this;

Ian/I1: *Well, I used to want to be a Vet, but then I saw Animal hospital and saw all the guts and gore, that changed me mind so now its probably something to do with computers like animation for games and what have you.*
RQ: *SO ARE YOU INTO GAMES THEN?*
Ian/I1: *Yeah, I like computer games, I don't like racing games because they drive me up the wall. They are really boring, like broom, broom, broom. I like space ship games where you go out and blow each other up and things, they are usually 3D which is better, moving in three dimensions is better than racing games where you just go round and round and round, and I like some of the older games, like 'Lemmings', that's only an Amega games, it seems to work on will power alone, you know.*

John/I1: *I might do some school work, but mainly I might go on web sites to look for games and that, look up new games, cheats and all that.*
RQ: *RIGHT, WHAT SORT OF GAMES DO YOU PREFER?*
John/I1: *Role-play games like mysteries and all that.*
RQ: *CAN YOU JUST GET ON TO THESE GAMES OR DO YOU HAVE TO SUBSCRIBE TO THEM OR SOMETHING?*
John/I1: *Some places you have to subscribe, but for some small games that are quite good you just go straight on. There's quite a few sites, yeah there's loads.*
RQ: *SO YOU WOULD SPEND MOST OF THE EVENING PLAYING GAMES?*
John/I1: *Yeah.*

RQ: *WHAT SORT OF THINGS DO YOU DO ON THE COMPUTER?*
Lee/I2: *Play games and stuff.*
RQ: *WHAT SORT OF GAMES?*
Lee/I2: *Driving games, football games and stuff.*

Lee/I2: *Well I have priority because its in my room, sometimes I just spend a couple of hours just playing on games. If I'm not in the house she just goes up and uses it but if I'm in she asks.*

The females in this study perceived this use of the resource as a waste of time and generally associated male use with time wasting;

Cath/I2: *It's either a tie between me and my little brother, but my little brother only goes on for the games, I go on for all the interesting stuff, I don't really play the games anymore because I like looking around.*

Pam/I1: *The boys are always on, but they just mess about all of the time, I suppose I'm not much better using chat rooms so much but at least I use it for work as well, the lads, like K.. and R.., they are always on those stupid games. All the games are the same, shoot somebody, somebody shoots you, just that stuff.*

The females did appear to devote a high proportion of their time on electronic resources to the use of chat rooms;

Gwen/I1: *You go to 'Teen Chat', it takes ages to get in there, you can't always get like 'Teen Chat'. You either go to 'Teen Flirt' and all the other places to chat are on there, you can't exactly get the one you want all the time cos there's different things. Granddad says its canny rubbish cos like you can't exactly get like what you want, and you just chat to people for ages.*
RQ: *DO YOU CHAT TO THE SAME PEOPLE?*
Gwen/I1: *No, always different people.*
RQ: *DO YOU EVER DO ANYTHING ELSE ON THE INTERNET?*
Gwen/I1: *No.*

RQ: *HAVE YOU GOT ANY HOBBIES?*
Pam/I1: *I like to read, I go to Air Cadets, I'm training to go into the RAF but I don't think I'm going to go anymore. I do like computers but I haven't got one at home so I do spend a lot of time on the school ones, its a bit cheeky but I do spend a lot of time on 'chat rooms'. TV and my hamster.*

Pam/I1: *We'll still be here at half past five sometimes because nobody chucks us out. Nobody really notices cos there's a bell that goes at quarter to and you've got to be out by 5 but from 4.30 you're allowed on the chat rooms so people completely loose track of the time anyway and then people are still on the chat rooms at 5.30 and the staff here just give up and go home. So we end up sitting here until someone remembers they've got to get a bus and then when they walk out everyone else starts to realise and goes as well.*

RQ: *ARE THERE ANY RESTRICTIONS IN HERE ON WHAT YOUR ALLOWED TO DO?*
Ruth/I1:*Yeah, you're not supposed to go on the chat rooms unless its after school and your not supposed to go on illegal pornographic things, your not supposed to go on games and stuff that isn't for school but you always do.*

RQ: *ARE YOU ALLOWED TO GO ON CHAT ROOMS?*
Annie/I1: *You're not but you can get through it easily and that's all people do, you just make a backup screen and put that up when the Librarian comes and she doesn't know.*

Karen/I2: *It's all the chat pages, I want to go on but I haven't yet, my friend has done it loads of times and she sends all sorts of strange messages, they aren't true. It would be fun to have a go and see how much they believed of what you told them.*

It would appear that the males in this study had similar feelings concerning 'chat rooms' as those expressed by the females in relation to computer games;

Cath/I1: *My brother wastes loads of time on those stupid games, I always give in and let him use the computer because he makes so much noise and whinges on if I don't. I think those games probably whittle his brain away.*

Gwen/I1: *I can't see the point of most of the games, they are really stupid but you should see the lads when they play them, their eyes nearly pop out of their heads, their brains as well I think.*

Karen/I1: *Me and my sister never play games much, they're a waste of time, my Dad does, he starts off by saying he has work to do but he always ends up playing some stupid game or another before he's finished.*

Bill/I1: I don't use chat rooms, the lasses do, they talk to anybody, I go on discussion groups sometimes about my games, but that's not the same as just typing in some rubbish to a bunch of strangers.

Ian/I1: The chat rooms are okay I suppose, most of the girls only come in here to go on chat rooms, 'Aqua Chat' is the one they are into now. I've been on but its stupid, just loads of chatting about nothing important.

During interviews the females in this study frequently made light of their own abilities, often claiming to be totally inexperienced with electronic resources. When observations were carried out they often appeared to have a much greater level of competence than they had indicated. Cath had said she was no good at using search engines yet during an observation she located the information she needed efficiently, when asked about this she said;

Cath/O2: *Oh, when I said I was no good at using this* [Altavista] *I meant that there's probably a better way of doing it, I do usually find stuff but I don't suppose it's always the best way of doing it.*

Karen also made light of her abilities during interviews, saying that she relied heavily on her father for support, yet during an observation she carried out a relatively complex search on Encarta, making use of several advanced search functions, when asked about this she said;

Karen/O2: *Well I can do this but I just don't know if it's the best way to go about it, I usually show my Dad and he tells me if it's okay to do it this way or not.*

Gwen frequently referred to herself as 'stupid', claiming to 'not understand' how to search for information, during an observation she located information for a History project, scanned the information on the screen and selected relevant pieces for her homework. When a comment was made about the success of the search she said;

Gwen/O2: *Yeah well, I think that was luck, I usually am pretty stupid and all of this goes over the top of my head, like most things.*

All but one of the males in this study were confident about their ability, they constantly claimed the Internet and CD ROM's were easy to use and claimed to be highly competent in using them. Observations showed that they were rarely as capable as they had claimed to be.

Bill/I1: *It's easy to find things on the Internet. I know what I'm doing so it's quick.*

Fred/I1: *The Internet is easier than books because all you have to do is type in the words you're looking for. I suppose it might be hard or someone who like didn't understand it but I do, so it's easy.*

Ian/I1: *The Internet is easy to use, just type the word in the box in the search engine, click and that's it, I like it because it's good to use, I use it a lot so I'm pretty good on it.*

Lee/I1: *I know like most of the ins and outs of the PC so if I make a mistake I can like get out of it easy. I know what I'm doing on it.*

Bill carried out a basic search on Yahoo and received 2,748 *hits* he made no attempt to refine his search and only read the first site on the list, the title of which was vague, he spent thirty minutes trying a variety of keywords without much success;

Bill/O2: *Oh, I think I typed in the wrong word, I might try something else, this always happens, you always get stuff you don't want, I suppose it's better than getting nothing at all.*

Fred was looking for information on the *Industrial Revolution* and was trying to open Encarta, there were two version available, one was networked, the other had to be inserted, Fred choose the new version which was not networked. He repeatedly clicked on the desktop icon for this version even though there was a message on the screen telling him to insert the CD, he appeared not to understand the process;

Fred/O2: *Oops, I think I've gone in the wrong program, I've used it before so it must be broken or something, it never says that, what does that mean, there isn't a CD, it's the schools Encarta.*

Ian was looking for information on game *cheats*, he spent one hour sifting through the vast amount of *hits* he had received after typing in *game cheats* without formulating any search strategy. He made no attempt to refine the search nor did he appear to think he should;

Ian/O2:*You see, I told you it was easy, there's loads of sites, now all I have to do is look at them and find the best one.*
Researcher: *THAT COULD TAKE SOME TIME.*
Ian/O2: *Yeah, but at least I found loads.*

Lee was trying to find information on irrigation and was experiencing some difficulty in deciding what to use;

Lee/O2: *This is all just rubbish, I can't tell if it will be any use or not, maybe I should type in irrigation and something else, I don't know what. It's been a waste of time tonight.*

7.5.3.2 Discussion of findings

This research suggests that there appears to be a very distinct gender difference in the use of electronic resources. Girls appeared to spend much less, if any time, playing games, they prefer to spend time online communicating via 'chat rooms'. Boys appeared to devote a very high proportion of their time to playing games and searching on the Internet for free games and game *cheats.* Every one of the boys in this study appeared to use the computers primarily for games, even Internet access was dominated by a need to locate and download game *cheats* or free games software. This would support the research carried out by Land [1999] that there is in fact clear gender disparity in the use of online resources.

One issue, which was evident by using both interviews and observations, was the level at which males and females gauged their own ability when it came to searching for

information. During the interviews the females frequently made light of their own abilities, often claiming to be totally inexperienced with electronic resources. When observations were carried out they often appeared to have a much greater level of competence than they had indicated during the interviews. Conversely, the male participants in this study were keen to demonstrate their knowledge of the EIRs during interviews. With the exception of two males, who both used electronic resources frequently, observations revealed that they often had difficulty in applying the skills they had laid claim to in the interviews. They would frequently blame the resource, rather than themselves, for errors in retrieval.

7.6 Major research findings

> 'The power associated with possession of knowledge is limited to those who have the economic resources to acquire access to the new technologies and are in a social environment that enables them to use that access effectively.' [Doctor 1991 p220]

The aim of this research was to answer the question; does access to EIRs have a role in breaking down barriers to learning encountered by young people? If so, how, why and under what circumstances, thus providing a clear understanding of the use of these resources. It was hoped that this would then lead to a guide to good practice in the provision of these resources to young people.

7.6.1 Technical and organisational variables

The availability of computer hardware to the young people in this study varied greatly and was dependent upon socio-economic factors such as; the school they attended, their local public library authority and the financial status of their families. It would still appear to be possible for young people to reach the end of compulsory education without having had any structured access to EIRs. Hardware being physically present is not sufficient to claim access. If hardware is not regularly maintained then these young people lack confidence in the availability of the resource and are unable to depend on regular access. The quality of the hardware and software influences use. Learning opportunities are denied to these young people when this quality fails to match up their own standards. The physical presence of computers, printers, scanners and the many other hardware elements is of relatively little use if charges are imposed on this access, thereby excluding many potential users. The young people in this study who appeared to be in most need of access to this equipment in schools and public libraries were those who did not have access at home. Very often this lack of home access was related to lower income, making these people the least likely to have the

financial ability to purchase use. Even home ownership of computers does not guarantee access to appropriate electronic resources. Telephone charges could prevent Internet access, and the cost of many CD-ROMs could prevent ownership. Geographical issues also played an important role in the availability of these resources. Living close to school or to the public library appeared to be a distinct advantage. Some social environments force parents to place tight restrictions on the movement of their children. In other areas young people may have to depend upon public transport to travel relatively long distances. In either of these situations anything other than home access proved too difficult for a number of these young people. There is evidence to suggest that there is still vast disparity of access to computer hardware by individuals.

There was evidence to suggest that demonstrations appeared to be of little use in the retention of information. Watching 'experts' carry out particular functions did not appear to contribute to learning. It was only when these young people engaged in their own searching activity that they appeared to retain any of the knowledge they acquired. Technical support appeared to be of most use when it was offered at the appropriate time and at the appropriate pitch. Peer and tutor intervention did contribute to learning, providing it was available when it was needed and offered in a way that could be accommodated by the individual.

7.6.2 Cognitive variables

Intellectual access to, and use of, EIRs is dependent upon a number of factors. The success of these resources in the learning environment is directly linked to the individuals' capacity to acquire and apply the skills demanded by the resources. This research supports claims that information skills training would appear to be more relevant to these young people now than at any other time. The proliferation of accessible information has placed an even greater demand on the individual to acquire and apply these skills on a daily basis across the entire spectrum of information seeking [Johnson, 1995]. Some past research claims that the same skill used to locate information in the print based environment can be used to locate information in the electronic environment [NCET, 1993]. This research supports claims that those skills cannot always be transferred to the electronic environment [Yang, 1997]. Search strategies created a great many problems for the participants in this study. They appeared to have little knowledge of standard search procedure. This supports evidence from other

research that students need to be focused about a specific task and devise a strategy before they begin [Spaven, 1999].

Navigating the three-dimensional hypertext environment would not appear to be the liberating experience it is often claimed to be. Often it can be confusing. It creates barriers to access that need to be addressed before it can actually begin to provide the benefits that may be possible in the provision of learning opportunities to these young people.

There are also issues relating to the quality and quantity of information which create their own problems and increase the pressure on the individual to act as their own information filter, a role that has traditionally belonged to publishers, librarians and teachers. New technologies also allow for new forms of presentation of information, providing the individual has the ability to use these technologies. There is increasing disparity between those who have the technical *know how* and those who do not. The highly demanding and complex cognitive requirements of these resources are often overlooked or even dismissed by those promoting the resources as an effective tool. This can have a negative impact on the use and perception of resources such as the Internet and CD-ROM.

There appeared to be very little formal instruction given to the young people in this study by teaching staff, the general opinion was that access and using electronic information was *quick* and *easy* not requiring any structured teaching. Teachers often gave instructions for pupils to 'look on the computer' without specifying which resource to use or how to use it. When asked about this, teaching staff were open and frank about their own lack of clear understanding. They had an 'idea' that the information would be available in electronic form but they could rarely be more specific. On the occasions where students were directed to a specific resource for a specific purpose there was successful incidents of discovery and use.

7.6.3 Affective variables

The belief that all young people are familiar with new technology and have the intellectual ability to apply this technology is a very common assumption. This brings with it a great deal of responsibility for young people and creates standards they are not always able to live

up to. The very nature of the resource brings with it a high level of motivation. Media hype, the image of the computer as a gateway to all knowledge and the fashionable nature of the medium all encourage use. The nature, location, and type of resource provision however temper this. These young people find electronic resources fun to use, interesting and more exciting than traditional resources. They use the resources for project based research and recreational activities, however this motivation is often very fragile. They are quickly discouraged when those resources do not respond as expected and do not perform as promised.

The location of electronic resource access affects the users feeling towards both the technology and the information. The location of access was of great significance to these young people. There was strong evidence to suggest that home was the preferred location for those young people who had their own computers.

There needs to be some alignment between user expectations and system capabilities in order to reduce the feeling of individual failure that is often promoted by these resources. The consistent hype concerning the capabilities of electronic resources has created a new mythology amongst young people that exaggerates the individual's inability to use these resources profitably. The individuals' perception of their capability influences the impact of access to electronic resources in relation to learning opportunities.

7.6.4 Social variables

Economic factors play an important role in access to EIRs. Access to these resources is often highly dependent on the individual’s ability to pay for access and training. Acknowledgement of this situation by Central Government would indicate that the disparity of access between those who can and cannot afford access and training is likely to decrease. However, home access, although of great significance, is only facet of this issue, public access is also highly significant.

Peer interaction can be placed along a continuum which is governed by the distribution of knowledge amongst the young people themselves. One extreme pole is peer tutoring, when one of the pair or group has more knowledge than the others, not necessarily a great deal more but sufficient to allow them to guide and instruct their peer group. The other extreme

of the continuum is peer collaboration when knowledge is distributed evenly between the pair or across the group. Both extremes appear to be of great benefit in the use of EIRs. Peer interaction allowed these young people to reverse the traditional pupil-teacher roles and place themselves in a position to both ask and answer questions, to give and follow directions and to speak in their own language about their own concerns. Unless actively discouraged by the environmental setting peer interaction takes place as a naturally occurring phenomena. The interactions observed in this study were rarely, if ever, artificially instigated, they happened as a natural solution to a problem or a social event.

Gender issues still appear to be of significance in relation to the impact of access to EIRs on learning opportunities, although this research would suggest that this is more to do with individual perceptions than with individual school or public library authority policies. It would appear to be a social characteristic that has become ingrained in the individual, however the planning and delivery of EIRs could be instrumental in changing these perceptions.

The impact that access to EIRs can have on learning opportunities for young people is still dependent upon social variables. These variables need to be considered when planning and designing the delivery of information skills training and when planning for the provision of these resources for young people. There is evidence to suggest that, although many of these issues have been recognised, there are still young people who remain in danger of becoming disenfranchised because of their limited access to information.

7.6.5 Summary

The nature of this research does not allow for generalisation of findings but there are global issues that have become apparent from a local level. These issues can inform practice at a wider level and suggest ways forward in the management of EIRs.

The disparity between ‘information rich’ and ‘information poor’ is increasing. These young people demonstrated that home access leads to a better understanding of EIRs and increased confidence in the use of those resources. Some of the participants in this study accepted that they would never have home access to a computer. They hoped they would but were aware that their economic situation would not allow for this. They all aspired to owning their own

computer and said that eventually they would but not in the near future. It would appear that those who are more proficient in the use of electronic resources are also more privileged with levels of access. Not only do they have home access, but teaching and library staff are more inclined to allow greater levels of access to the more competent users. EIRs have become swathed in symbolism and surrounded by there own mythology. Myths have been created and compounded by marketing strategies, imaginative exaggeration and distorted perceptions of reality. Training and education in the use and application of these resources are necessary to develop a clear understanding of the value of these resources on learning opportunities to young people.

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8 Emerging themes and suggested ways forward.

8.1 Introduction

Walsham [1995] identifies four types of outcome, which can be drawn from constructivist case studies. These are; generation of theory, development of concepts, contribution of rich insight, and the drawing of specific implications. This research has generated theory in the form of major research themes, which, in some cases are the further development of existing concepts. Rich insight is provided both within the analysis and the in-depth description of individual case studies in Appendix 4. Specific implications will be presented here following the major research themes. In addition it is hoped that this research has moved closer to developing a quality framework for measuring value and impact at a local level.

The purpose of a constructivist approach to research is to provide detailed descriptions of unique cases which can be used as the basis for transfer of findings by readers to their own, unique, case. These descriptions can then 'be used to expand and enrich the repertoire of social constructions available to practitioners.' [Donmoyer, 1990, p.182] However, if there is an existing body of knowledge available then it is also possible to integrate findings from unique cases into that growing body of knowledge. As stated by Ellis, one of the objectives of a study of information behaviour using grounded theory is to 'develop an awareness of the perceptions that individuals…have of their information environment…' [Ellis, 1993, p.484]. This research has built on these individual perceptions, and used cross-case analysis to identify themes present in each case and across cases. This does not reduce the importance of the individual but rather it highlights the significance of individual perceptions within their own context. A number of major research themes have been identified by this study as being potential drivers for, or negative barriers to, learning opportunities in the electronic information environment. Some of these are theoretical issues which it is hoped will contribute to research in this area. Others are more practical concerns which it is hoped can inform and enhance current practice in the management of EIRs.

The following framework is a representation of the analysis of both primary and secondary data harvested during this study. It places the themes identified during the cross-case analysis within the context of the learning opportunity model devised in Chapter 4.

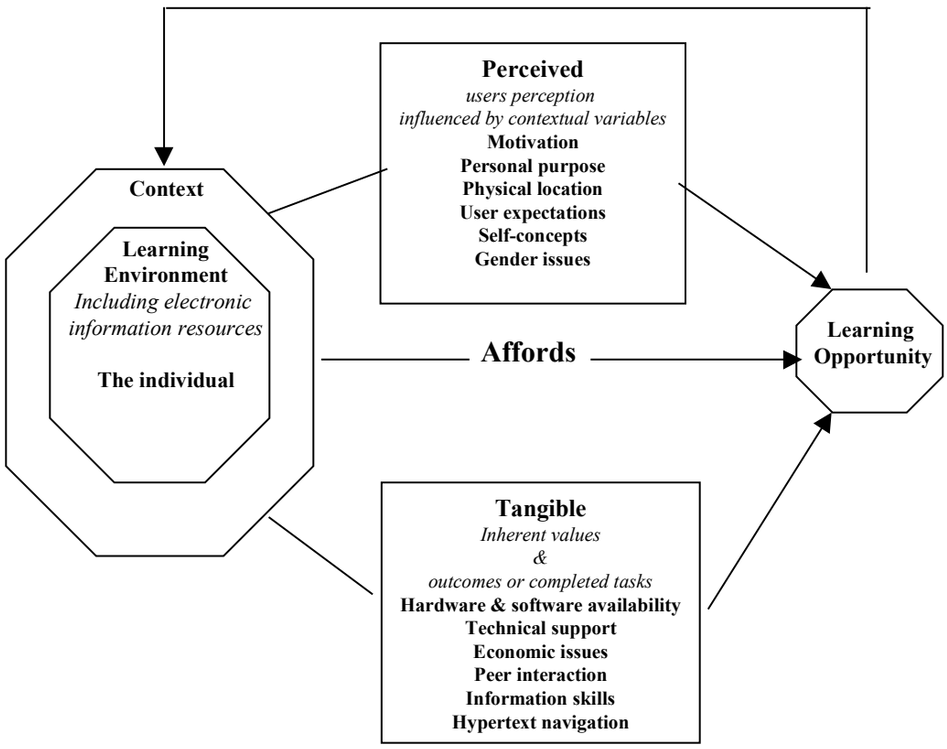

Figure 8-1 Suggested framework of potential learning opportunities in the electronic information environment.

8.2 Major Research Themes

There are a number of themes which have emerged from this study. Some support or challenge previous research and some have emerged which appear to have received little or no attention in the literature to date. The latter appear to have emerged as result of the long-term observation and exploratory nature of the study. These particular themes could not have been identified prior to the study, and justifies the methodological decision to allow the study to ‘roll and cascade’ [Lincoln and Guba, 1985].

8.2.1 Equitable access

The focus of the study was the role of *access* to EIRs in the provision of learning opportunities. Access here refers to both physical and intellectual access to the relevant resources. The discussion in Chapter 4 concerning equity of access highlights the need to consider what is meant by 'equity'.

The physical provision of computers and EIRs amongst the young people in this study depended on three major socio-economic factors. These factors were:

1. The emphasis placed on these resources by organisational [home, school, and public library] management;
2. The availability of funding to purchase and maintain these resources;
3. The technical expertise of existing members of staff or family.

The first barrier to physical access is a lack of initial capital expenditure. Being unable to afford a computer prohibits access at school and in the public library, but the greatest personal impact is not having access at home. The second barrier is the cost of access to available resources. Most public libraries and some schools charged for access to the Internet and use of printers. In the public library this also included access to a computer and use of CD-ROMs. This proved to be an insurmountable barrier for some of young people. It was usually the young people who did not have access to home computers that were also unable to afford the cost of access at school or in the public library. The third barrier is the cost of ongoing maintenance, the cost of telephone charges for Internet access and the cost of CD-ROM databases. These will remain a barrier for many young people and their families for the foreseeable future. This is more obvious with home access but without proactive intervention at the level of national government to remove charging policies, it will also remain a barrier to public access.

Although a common feature of school policies was one of 'open access' there was little evidence to support these policies in practice. The allocation of time on computers appeared to be left to the discretion of individual members of staff. Very often it was the most competent students who were given priority thereby denying those with limited knowledge the opportunity to develop their skills. There was evidence of exclusion policies that prevented the young people in this study from accessing the Internet. These policies were often not made explicit to the young people involved and they would often find themselves barred from the system without understanding why.

The most obvious cause of disparity was that of home access to EIRs. The participants in the study were purposively selected, and this disparity was one of the selection criteria used. Home access was a perceived advantage by all the young people concerned. This confirms

the findings of previous research by Martinez [1994] and Sutton [1991]. There was also evidence to suggest the basis for this perceived advantage. Those with home access had more time to practise and refine their use of electronic resources. The most significant difference between home and school access was being able to 'make mistakes at home'. Students felt more empowered to experiment with the resources at home as they did not have to worry about performing an action that could affect the school system or result in being barred from that system. Those with parents who had good ICT skills were also more willing to engage in risk taking as their parents would be on hand to provide assistance. The emphasis was on how they felt about using the resources at home rather than the amount of time that they had to use them. The environment was safe and they felt empowered by the situation. Those without home access were acutely aware of the more advanced skills exhibited by their peers with home access and felt they were disadvantaged. The young people without home access appeared to recognise the potential for them to become disenfranchised. They felt excluded from a major social phenomena which located them on the wrong side of the digital divide.

The Government's vision of a *National Grid for Learning* which is 'comprehensive, relevant, differentiated according to needs, and readily accessible…' [DfEE, 1997a, p.6] appears to be far from attainable within the current climate of financially limited provision. Disparity of access becomes inevitable when schools and public libraries are forced to place financial imperatives before educational goals. There is also a common assumption that learning is a priority. This can result in related assumptions amongst educationalists and politicians that all parents regard investment in learning tools as a 'good' thing. However, not all parents prioritise learning, some have other priorities. These may be influenced by financial considerations but social and cultural elements also influence choice. If this disparity is to be challenged, then public access offers a possible solution that could minimise exclusion to potential learning opportunities. Ultimately young people are not the architects of their own environments. They must rely on the behaviour and beliefs of the adults who design and manage those environments. This is evident both at home and in public institutions. Access will remain disparate regardless of current Government led initiatives. It would appear that access at school and/or in the public library is one way of minimising this disparity.

Although home access may be a bonus, it is possible to lessen the disadvantages by providing a basic level of access in public institutions.

8.2.2 Information skills

The acquisition and application of information skills has taken on a more central role in the curriculum with the proliferation of information and information resources [DfEE, 1998]. The young people in this study were potentially no longer subject to restrictions on access to information by space and time. Although many restrictions still exist, there remains the potential for far wider access than ever before. That brings with it responsibility for managing that access at both a personal and organisational level. These individuals need to be empowered with the skills necessary to maximise the opportunities afforded by EIRs. The cross-case analysis was presented using the 'PLUS' model of information skills in school. [Herring, 1996] It is appropriate then to present this research theme within that same framework.

8.2.2.1 Purpose

The first stage in the 'information skills framework' is identifying the purpose of the investigation and matching the appropriate resource with that purpose. There appeared to be very little evidence that this was actually taking place. The young people in this study rarely discriminated between resources on the basis of the information being sought. They appeared to have very little understanding of the facilities available to them. This was particularly evident when using the Internet. There was limited information provided for them concerning the variety of search tools available to them and how they could discriminate between those tools.

Those who were able to identify resources appropriate to the purpose of the investigation tended to be those with home access and parents who had experience with and knowledge of, the resource. There was also some evidence of successful matching of purpose to resources by those who had been given formal instruction on evaluating resources. In both of these cases the ability to establish this match resulted in more productive information behaviour and increased self-esteem. Perceived affordances of the technology were identified and relevant action was taken. This initial stage is the key to subsequent success or failure. Although matching the purpose to the appropriate resources does not in itself

guarantee success, failure to do so can increase the probability of search failure. However, identifying and locating relevant resources was rarely guided by the purpose of the investigation. 'Ease of use' was the term most often used to explain why a particular resource had been selected. There was evidence that when purpose was matched to resource results were usually successful. One example of this was the use of CD ROM encyclopaedias to identify specific facts and using the Web pages of specific organisations to map current activity in a particular field.

8.2.2.2 Location of information.

Learners now need to locate specific information through EIRs that provide access to an information store that is growing at an exponential rate. This demands a more advanced ability to formulate effective search strategies and a deeper understanding of the facilities of search tools. Using search engines frequently created problem for the young people in this study. They had no knowledge of the extent of coverage of the search engine and no concept of its limitations. They demonstrated little knowledge or understanding of search strategies, frequently relying on single word keyword searches. They rarely viewed the 'Help' pages provided by the various search engines and CD-ROM databases. They were often unaware of how to formulate a search or apply advanced search features. There was also little evidence to suggest that there was any understanding of the concept of refining a search. Unsuccessful searches were repeated using new single keywords. These basic searches regularly led to vast quantities of information being offered which proved to be confusing and resulted in high levels of anxiety in the young people. This anxiety is a potential barrier to any learning opportunity that could be afforded by the resources in terms of process and results. Conversely, when searches were successful, confidence levels were increased and students were encouraged to practice more ambitious searching techniques. When students made the additional effort to investigate the 'Help' facilities they demonstrated the ability to accommodate this new knowledge and apply it to subsequent searches successfully.

There was evidence to indicate that simple, successful, first searches created confidence and this confidence encouraged further exploration. This increased the desire to become more proficient in the use of the resource and to develop more complex search techniques. It is important to acknowledge the potential complexity of searching in the electronic information environment and to ensure that young learners are aware of this complexity.

8.2.2.3 Use of electronic information

The most common method of using the information was to take hand written notes from the screen. Students also preferred to print out all, or as much as possible, of what they found. Although this is discouraged by charging for print facilities was introduced into school and the public library. The print out would be taken away, read and relevant sections would be highlighted and used in the assignment. There was very little evidence of discrimination in terms of selecting relevant material and manipulating that in a relevant and meaningful way before printing anything from the screen. Reading of the text from the screen was minimal. Within many CD-ROM databases it was thought to be sufficient to read around the highlighted keywords then print the entire section. There was little evidence to suggest that young people were able to manipulate the text electronically between software applications. Evidence from some students showed that there was the potential to conduct an almost seamless work flow between research online, reviewing information, processing and finally presenting through appropriate multi-tasking techniques. This was usually as the result of an interest in the software, expert instruction and time to practice the necessary skills in a 'safe' environment.

This research has identified a lack of basic information skills teaching as a structured element of the school curriculum. Although national recommendations specifically refer to these skills there does not appear to be any generic provision for the teaching them. It is interesting to note that the young people in this study did discuss 'library skills' but rarely associated this with locating and using electronic information. This lack of connection was also evident when the researcher was negotiating access to each of the sites. The title of the research was inevitably associated with the ICT department and the researcher was pointed in that direction by school management. Access to the school Library or Learning Resource Centre had to be negotiated after initial meetings had taken place. There would appear to be an urgent need to address the teaching of information skills and for information professionals within schools to be proactively involved in that teaching. In the one school in this study where there was interaction between the information professional and teaching staff it was clear that a structure was emerging that encompassed the whole school but was focusing on the library as the point of convergence. It appears to be insufficient to provide recommendations at a national level. National policies need to become integrated into the school curriculum.

8.2.2.4 Self-evaluation as part of the process.

This study has shown that regardless of levels of competency in using EIRs, coping with vast quantities of information obtained from these sources is difficult and often distracting. Meta-cognitive skills appeared to be neglected, students were not particularly aware of the need to scrutinise their own behaviour. The GCSE History syllabus specifically requires students to discriminate between types of information. There was evidence that the young people in this study were able to make informed choices about information available to them in History through electronic resources, specifically on the Internet. They were aware of the need to discriminate between factual event and personal opinion because they had been specifically alerted to this and had been shown examples of the information in question. It appeared that this skill was then compartmentalised and only ever applied in the context of History based research. There was nothing to suggest to the student that this was intended to be a generic skill that could be applied both across the curriculum and in personal research.

This study found no evidence to suggest that self-evaluation in locating and using electronic information was encouraged in any of the locations other than in the home. Even in the home self-evaluation was only encouraged when parents had personal experience of EIRs and could provide guidance to their children. The end result of the process was consistently seen as the finished assignment. There was no indication given to the students that there were also some significant lessons to be learnt from the process. When there was a clear goal defined, and information seeking was specifically mentioned as part of that goal, the process did assume a more prominent role. It is appropriate at this stage to acknowledge the presence of the researcher in this study. The emphasis placed on information seeking by this study had, by the end of the field work, encouraged some of the participants to be more critical about their own information behaviour and their learning. This would suggest that when emphasis is placed on information behaviour these young people are able to develop the skills necessary to evaluate their own behaviour.

8.2.3 Learning becomes the driver.

The introduction of EIRs needs to be driven by the potential they have to afford learning opportunities. The technology often assumes a central role when provision is being debated and this is often at the expense of the real purpose, which is learning. The emphasis is frequently on equipment and the driving force would appear to be installing as many

computers as possible within the institution. There is also an element of what Maddux [et. al., 1994] refers to as the 'Everest Syndrome' or educators using hypermedia just because it is there. The purchase and application of technological hardware and software often falls into that same category. Although the need for suitable hardware and software is undisputed, the provision of learning opportunities must remain the driving force. This suggests that rather than increasing the speed at which computers are being introduced into school and public libraries, it may be more beneficial to analyse the purpose of that installation and ensure that they are fit for purpose. As the obsolescence cycle continues to shorten, maintaining an adequate network is becoming more and more costly. If the focus is on developing policies and structured programmes it is possible that the number of computer workstations available ceases to be the central issue. This would also allow the less affluent Authorities to bridge the gap with efficient and effective programmes rather than trying to compete for numbers of computers available.

8.2.4 Peer and tutor interaction

Social interaction plays a significant part in learning. This study has shown that young people benefit from working with their peers to develop high levels of cognitive skills. This development was not only evident in the novice being instructed but also had a positive influence on the *expert* providing the instruction. EIRs appear to encourage peer interaction. These young people enjoyed working together to solve complex information seeking problems in the electronic environment. They would often reverse roles individuals demonstrated their expertise in different areas. The less competent users gained confidence from working alongside a more experienced friend and they appeared to retain and accommodate this new knowledge and apply it to other situations. They frequently shared information located through electronic resources. There was very little evidence of information hoarding.

The staff in libraries and learning resource centres did not encourage this sharing. There were rules in all of the locations which specifically prohibited people sharing a terminal. The most common reason for this was to prevent them from getting distracted and not getting on with their own work. However this study showed that peer interaction contributed to a very constructive working and learning environment. Generally the young people did enjoy this experience, they had fun and they increased their knowledge and understanding. If this peer

interaction were to become a recognised form of instruction it could provide a very useful tool for both students and staff. Young people learn well from each other, whereas training programmes are time consuming and labour intensive. This would suggest that there are significant benefits to be gained from encouraging an activity that is already popular and has been proven to contribute to learning.

8.2.5 Navigation of complex, non-linear environments

The complexity of navigating the hypertext environment has been identified as the most difficult aspect of electronic information use [Dillion, 1994]. This study has confirmed that it often led to disorientation and anxiousness amongst users. This frequently distracted them from the main task and created a barrier to any learning that might have taken place [Pickard & Dixon, 2000]. It also led to them ending a search feeling powerless and assuming that they were to blame. Responsibility was never attributed to the system they were using. Providing detailed and structured guidelines on the organisation of hypertext would not only increase student understanding of the structure, but may also shift the perceived balance of responsibility from the individual to the system. Students may well begin to understand that it is a difficult task to navigate this type of structure when this is acknowledged by influential authority figures. Evidence suggests that it is possible to provide a suitable learning model to allow learners to adapt to the three-dimensional space they travel in when using hypermedia. The skill demonstrated by some young people when using 'chat rooms' indicated that when motivation was present spatial awareness increased rapidly.

8.2.6 User perceptions and self-efficacy

Very often young people attribute failure in electronic information use to themselves, the individual, and this has a significant impact on the use of electronic resources. It also impacts on the confidence they have in their own ability to become skilled users of EIRs. There is a need to redress the balance of responsibility and one possible solution could be increased knowledge and understanding of the capabilities of the resources being used. In this study it was the young people with the most accurate knowledge of the resources and the technology who were the most confident users. They demonstrated confidence in their own ability and a critical awareness of the limitations of the technology. This frequently resulted in successful searching but even when this was not the case the individual was not over- critical of their own behaviour without taking into consideration the extent to which the system contributed to the problem. Bruckman [1998] reminds us that young people are

under constant pressure to excel. She points out that computers could be intensifying this pressure, 'fostering a generation who will never live up to their own expectations' [p60]. This study did support the notion that young people frequently experienced feelings of self-doubt and frustration. An element of this can be attributed to the difference between users own expectations and system capabilities. Encouraging the belief that EIRs can provide quick and easy access to a vast store of knowledge will compound this belief. High expectations of systems capabilities coupled with repeated experiences of search failure ultimately result in feelings of low self-efficacy. These feelings of incompetence are often difficult to reverse.

Young people need to be provided with accurate and realistic information concerning the capabilities of the technologies they use. They should be allowed to explore and investigate the capabilities of these technologies before they develop inaccurate impressions of those capabilities. The popular rhetoric associated with EIRs, often confirmed by their own teachers and parents, creates an ethos of confidence in the resource. This often means that the only option available to explain search failure is to assume personal responsibility for that failure. For the young people in this study that responsibility was assumed almost immediately after each failed search. When this pattern was repeated they began to anticipate failure from the outset. This can then lead to a reluctance to use the resource and create a potential barrier to learning opportunities. The value of fostering confidence in the electronic information environment is that it can empower and motivate users to explore and investigate systems without being afraid of failure.

8.2.7 Gender

There is evidence to suggest that there are clear gender differences in the use of EIRs. Evidence from this research would appear to support the findings of previous work. The vision of the electronic environment as a male domain identified by Underwood and Underwood [1996] was evident in this study. The work of Leong and Hawamdeh [1999] indicated that mixed gender group work involving EIRs could reduce gender disparity, and this study supports that finding. Gender differences in attitudes towards the medium were also present in this study. The use of these resources by male students and female students differed more on the basis of their attitudes towards the technology rather than to a like or dislike of that technology. The female participants in this study tended to look beyond the

technology and sought out the social function of medium, which supports the findings of Leong and Hawamdeh [1999]. Females often used the technology to extend their existing social circle. Male participants applied the technology to maximise their own individual achievements. Males were more interested in the technology per se. This was most clearly evident in the use of 'chat room' and game software. There was significant evidence to suggest that recognition of the differences in attitudes, and accommodation of those differences, could enhance learning opportunities for both male and female learners.

8.3 Practical implications and Suggested Strategies

8.3.1 Policy Development.

Policies at a national level, which include access to EIRs, physical provision and training, would provide a basic framework to guide individual organisational practice. Recommendations which are currently made within National Curriculum documentation, are evidently insufficient to ensure equity of provision at individual locations. These policies would necessitate a financial infrastructure that is aimed at preventing disparity and exclusion. These policies would then need to be reflected at the level of local authority to provide a point of reference for individual organisations within that Authority. At the organisational level, policies need to be developed which best address the needs of the individuals within the institution in line with local and national policies. In order to address local and individual conditions, national policies need to provide scope for interpretation whilst ensuring a basic level of provision.

8.3.2 Public access.

This research has shown that home ownership of computers and access to appropriate EIRs can not provide equitable access whilst diverse attitudes to technology and learning amongst teachers, parents and students continue. There will always be those who do not prioritise learning and do not see the significance of access to EIRs to that learning. This is a social phenomenon that is unlikely to disappear. If young people are to be provided with effective and efficient access to the information potentially available to them, then the onus is on Government to ensure public access. Evidence shows that, as yet, the public library has not achieved the high expectations established by Government initiatives but it is imperative that they do. If public libraries are not the 'ideal' location for open access to electronic information then measure need to be taken to correct this. One possible solution is

developing closer links with local schools to encourage the students of those schools to regard the public library as an extension of their own school library. This is unlikely to happen until Public Libraries can offer access to electronic resources that at the very least equals that offered in the school.

8.3.3 Provision of adequate and appropriate resources.

The current trend appears to indicate a drive towards providing access to 'everything' for 'everyone'. This inevitably leads to confusion and in an effort to attain this maximum coverage managers may be losing sight of the opportunities that these resources can provide. Resources should be targeted based on their potential to enrich the learning environment of the users. They should be provided at a level where they can be effectively managed and maintained within the boundaries of the institution's capabilities. This would provide focused access to specifically selected resources that have the most to offer in terms of access to relevant information. This includes providing suitable networks which ensure ease of use. One example of this is the networking of CD-ROMs throughout the institution. Many sites still depend on stand alone CD-ROM access that prevents more than one user accessing the database at one time. It can also mean that individual students are not aware of the extent of the resources available to them and are not sure how to locate and use those resources.

The implementation of school and public library networks needs to focus on creating learning environments that allow the learners to build on existing knowledge. Allowing them to explore and practice with new tools to enhance their own learning in environments that offer support and encouragement rather than focusing on the new tools. There needs to be clear identification of what each new tool can offer and how it can be offered in order to contribute to learning. Ideally this should be done prior to implementation, ensuring that teachers and support staff are aware of the functions of the technology. It is then more likely that more efficient and effective use could be made of EIRs as learning tools rather than being seen as only additional information resources. The ideal is rarely possible but it is essential that where this cannot be done prior to implementation, retrospective training for teaching and support staff should be prioritised.

8.3.4 Information skills training.

Directives provided in National Curriculum Guidelines suggest that information skills should be central to the curriculum, but this does not appear to happen in practice. The reality is that students, and very often teachers, only attach significance to skills which are assessed. The success of information skills training in the History syllabus would suggest that young people are receptive to this type of training and could accommodate this knowledge. It would appear that there are two potential solution to this issue. One would be to include the training from the History syllabus in the syllabi for other subjects. A more practical approach would appear to be that of proffering training as generic skills, to be applied across the curriculum with examples from all subject areas. This cross-curricular approach may put the onus of training on the library or learning resource centre staff with support and consolidation from all subject teachers. Formal assessment of information skills needs to be introduced at appropriate levels at all Key Stages of the curriculum. There are two approaches to this assessment. The pattern of assessment could follow that of the assessment of problem solving within the Mathematics syllabus. In Mathematics students are encouraged to provide evidence of how they reach a solution. Part of the mark for the assignment would be how accurate the individual steps in reaching the solution had been. Similarly, asking students to provide evidence of their search behaviour, evidence which would be awarded part of the overall mark, could not only encourage them to think about the process, but could also indicate that the information seeking process was significant to their learning. A proportion of the final mark for a set piece of work could include an element for the way in which the student arrived at the conclusion, that is, to assessing the skills applied in locating, using, presenting and evaluating the information found. The second solution would be to introduce an 'information skills' training programme that carried with it some form of recognised qualification. This would be generic to all subjects and would need the co-operation of all subject departments within the school. One example of this would be to establish some sort of qualification that received national recognition to certify that an individual had attained the required level of information handling skills. It is possible that this award could have more than one level. As an individual gained the certificate at one level they would be required to pass their knowledge on to those taking the lower level certificate. This would encourage peer interaction as well as taking the burden away from library staff. There are examples of individual schools creating a programme that is recognised within the school but this would be enhanced by national recognition.

8.3.5 Defining responsibility.

Library Association Guidelines are specific in stating that the appointment of an information professional within the school should be standard practice. When these guidelines are followed, and responsibility is clearly defined from the outset, it is possible to establish coherent and structured organisation for the delivery of information skills training. Very often there are no clearly defined boundaries within schools as to who is responsible for the delivery of training in information skills relating to the electronic environment. This lack of definition does not appear to be present when dealing within information skills in the traditional environment, where library skills are very clearly the responsibility of the library staff. There appears to a lack of consistency when it comes to the same skills being applied in a different environment, even though the basic concepts are the same. A qualified information professional should be in post to drive and organise the information skills curriculum within the school. This role is equivalent to a Head of Subject and as such the Librarian should have access to management committees and be in a position to co-ordinate a school-wide information skills programme. The teaching of these skills may be separate from the mainstream curriculum or embedded within that curriculum. This debate is highly significant but whatever the outcome the Information Professional needs to play a central role in the design and delivery of information skills.

8.3.6 Encouraging student involvement.

The young people in this study were not accustomed to being asked for their own opinion on many of the issues covered here. They provided valuable insight into the effectiveness or otherwise of current practice and offered useful suggestions as to possible ways forward. Student involvement could include user surveys, regularly seeking their opinion and appraisal of current information skills training programmes. It could also include involving the students in the design and delivery of such programmes. There is a growing body of knowledge amongst young people and encouraging them to contribute to school programmes could benefit both staff and students. The knowledge, skills and enthusiasm demonstrated by these young people appears to be a greatly under-utilised resource within the school environment. Once again the influence of the researcher must be acknowledged. The focus placed by the researcher on the individuals encouraged them to be more critical of

their own behaviour and to evaluate their role in enhancing the potential learning opportunities afforded by EIRs.

8.4 Recommendations for further research.

This in-depth, longitudinal study has provided significant insight into the way in which young people are currently using EIRs in their own learning. This was a small scale, localised study. The process would appear to provide an ideal format for practitioners to replicate in their own unique situations. Practitioners are in an ideal situation to conduct similar in-depth studies of their own users and to conduct those studies over time to allow for clearer insight. This would result in building a large store of knowledge on this phenomenon. There is a need to investigate the issues raised by this study on a wider scale. Looking at the impact these resources have over time would also provide for deeper understanding of the impacts on life long learning. Chapter 8 reflects on the research process of this study and offers insight into potential development and application of this process.

There were specific issues which were identified by this research but would benefit from more in-depth investigation. More research needs to be done on the possibility of developing a framework for the delivery of information skills in the electronic information environment that focuses on the potential contribution of the students themselves. This is related to issues of peer interaction and gender. More research is needed to investigate if and how these issues can enhance learning opportunities.

This research concentrated very much on the young people themselves but issues were raised which indicated that teacher perceptions of these resources could play a huge part in the way they are proffered to students. Parents are also in a position to impact on learning opportunities for their children. There is a lot to learn about the architects of the environments in which these young people find themselves. The focus here was on the role of access to EIRs on the provision of learning opportunities, there was evidence to suggest that there is also a need to study the role of interaction in 'virtual' and 'real' communities on the provision of opportunity.

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9 Conclusion

This research was designed to answer the question; does access to electronic information resources [EIRs] have a role to play in the provision of learning opportunities for young people? If it does, then how does it, why does it, and under what circumstances? It focused on developing an understanding of the individual user within their natural context. The fundamental issue of this research is the role of information in the affordance of learning opportunities to the young people at the heart of the study.

> ' Children in schools frequently engage in information-seeking tasks either for personal interest or as part of some instructional activity. It is a process that usually involves such activities as locating, selecting, organizing, interpreting, synthesizing, and communicating relevant information. In most instances, an assumed and implicit purpose of the information seeking is that some form of learning will occur. But it is not necessarily the case.' [Oliver & Oliver, 1997, p.519]

'Learning with hypermedia is essentially an information usage activity,' [Yang, 1997. p.71] which places this research firmly within the field of Library and Information Science [LIS]. Information, or access to information, has a vital role to play in the learning process. The focus of this study was the individual youth and his/her entire electronic information environment, both school-related and personal [Latrobe & Havener, 1997]. Although for the purposes of this investigation school was selected as the central location for a number of practical reasons. These were; to give the researcher access to a wide cross section of young people within the defined age range; to control access via the school; to provide a suitable point of contact for the researcher, the research participants and their parents/carers. Expectations of new information and communication technology [ICT], in relation to learning are great, and these expectations ‘are often used as the argument for the introduction of computers and ICT in schools and other educational settings’ [Hernwall, 1999 p.1]. However, initial inquiries carried out in the early stages of the research confirmed that there was disparity of access to EIRs through ICT between different schools, public libraries and homes. There was also a lack of consistency of access within individual organisations [BECTa, 1998; Cole, 1996; DfEE, 1997a, 1997b, 1999; NiAA, 1997].

The National Curriculum has made it possible for the school library to become the central agent in the delivery of the information skills curriculum. The management of many schools

and their use of resources and space is grounded upon the pre-technology curriculum [Richardson, 1993]. The durability of the school system indicates that it is unlikely to change radically due to new technologies [Brown, 1994 & Papert 1996] and yet 'technology is reducing the barriers of space, time, caste and language' [Chen and Kashper, 1992]. It is therefore possible that it could also reduce the barriers imposed by ability, disability, age, sex and motivation to learn. This may mean that opportunities are being missed by both learner and teacher and that some deep seated assumptions about access to EIRs in schools need to be challenged.

Recent reports on the standard of access to, and skills to use, class and school libraries have shown that there is inequality in access and therefore inequality of learning opportunities. There is evidence to suggest that 'the cognitive effects of the more recently developed environments are speculative. Research is needed to extend this understanding' [Kozma, 1991, p.210]. Ten years on this still appears to be the case [Klienman, 2000]. Much of the recent rhetoric concerning the benefits of access to EIRs is based on speculation and more empirical research is needed [Williams, 1999]. This study provides empirical evidence grounded in the study of 16 individual case studies and cross-case themes of present current practice and to determine ways forward in managing electronic resources in schools. Towards this end a framework of 3 aims and 7 specific objectives was established to guide and focus the inquiry.

Aims

- To answer the question; does access to electronic information resources have a role in breaking down barriers to learning opportunities encountered by young people?
- If so, how does it, why does it and what are the circumstances which influence this role? To provide a clearer understanding of the use of these resources.
- To suggest a guide to good practice in managing EIRs and develop a criterion based framework of potential learning opportunities in the electronic information environment.

A set of 7 specific objectives has been established arising from these aims to;

8. identify and evaluate current use of electronic information by young people.
9. establish the current context set by Central Government, LEA, and individual school policies.
10. establish what young people assume they are doing in relation to the process witnessed by the researcher.
11. consider motivation to use electronic information and the effect this has on the participants' learning.
12. establish the level and quality of information skills training available to young people, and examine its application during the information seeking process.

13. examine the conditions that influence use of these resources.
14. establish the conditions under which access to electronic information does impact positively on learning opportunities.

9.1 Methodology

The form of the research question was exploratory and descriptive. The use of electronic information by the young people involved takes place in their own, multi-layered environment. Their activities are interwoven into this framework and therefore their behaviour is significantly influenced by it. Therefore the research adapted the approach of Lincoln and Guba [1985], Stake [1995] and Yin [1994] to produce in-depth, holistic case studies. This approach would provide readers with sufficient contextual and environmental descriptions to allow them to transfer the case based on conceptual applicability. A second goal was 'to generate theory which is fully grounded in the data' [Dey, 1993, p.103]. Glaser and Strauss [1967] define a grounded theory as being one which is 'readily applicable to and indicated by the data' and is 'meaningfully relevant to and be able to explain the behavior under study'[p.3].

This research presented rich, descriptive narratives at a micro level to provide detailed descriptions which would allow readers to make sufficient contextual judgements to transfer outcomes, themes and understanding emerging from the case studies to alternative settings. Cross-case themes presented here provide theory grounded in the raw data of the individual case studies [Strauss & Corbin, 1990]. The concern here is with the multiple constructions of reality as experienced by the individual. Concentrating on individual access at a local level should help information specialists to address the pressures of how best to allocate resources and organise the provision of a service which needs to be effective, efficient and economic [Underwood & Underwood, 1990]. This constructivist methodology has two aspects; hermeneutics and dialectics [Guba, 1992]. Here the single, sealed unit, the holistic case, dealt with the hermeneutic aspect. The dialectic aspect was dealt with by workshops where participants were encouraged to compare and contrast the individual constructions of reality by debate, thus giving them the opportunity to confirm the credibility of their own stories and examine the cross-case themes as interpreted by the researcher. Each 'case is instrumental to learning about' the impact of access to EIRs on learning 'but there will be important co-ordination between the individual studies' [Stake, 1995. p.3]. This research focuses on 16 in-depth case studies of individual learners between the ages of 13 to 16 years

over an observation period of 18 months. The purpose of this research was to generate a grounded theory, not to test a theory that has been determined 'a priori'. A research model was developed based upon the framework of qualitative, constructivist inquiry. This study adopted a constructivist approach in order to provide rich, context-specific information at a local level, from the perspective of the young people themselves which can be transferred to other local situations, as well as contributing to the global picture. The choice of methods within this research had two main goals; firstly, to produce in-depth, holistic case studies [Stake, 1995 & Yin, 1993], giving the reader sufficient contextual and environmental descriptions to allow them to transfer the case based on conceptual applicability. Secondly 'to generate theory which is fully grounded in the data.'[Dey, 1993 p.103]. Constructivist case studies based on qualitative data were used to provide rich pictures of individuals and their interaction with processes, social relationships and organisational frameworks. A constructivist approach, focusing on sixteen, in-depth, holistic case studies [Yin, 1984] was used to produce 'rich pictures', which could then be transferred to other situations based upon contextually applicability. Each case was situated in the 'bounded system' [Smith, 1979] of one of four schools sites used and all were embedded in the macro-environment of national policies. These are holistic cases because the focus was on the individual young people, to call them embedded would have implied that each school was studied in equal detail to each individual participant [Yin, 1989]. This was not the design of the research, the school acted only as the bounded system for the participant. As well as individual rich pictures, cross-case analysis of all sixteen case studies identified issues which were generic across the research study, such as motivation, purpose, stress and application of information.

As the emergent design [Lincoln & Guba, 1988] of a constructivist inquiry does not allow for a detailed plan before the research begins 'the research design must therefore be 'played by ear'; it must unfold, cascade, roll, emerge' [Lincoln and Guba, 1985 p.203]. However, it is possible to develop a model which allows for the iterative nature of the study. A model was developed based on past research in the field and adapted from Lincoln and Guba's generic research model [1985, p.188 and 1988, p.104]. This model illustrates the entire research process conducted within the boundaries of *trustworthiness;* transferability, credibility, dependability and confirmability. The focus of the inquiry was the study of young people in their own natural setting investigated by a human instrument [the

researcher]. The human instrument applied qualitative methods, complemented by tacit knowledge, to that inquiry. Sequential snowball sampling [Maykut & Morehouse, 1994] was employed in order to achieve a sample of maximum variation [Patton, 1987], ensuring that each new research participant contributed characteristics differing from the preceding participants. This allows for multiple perspectives on the phenomena under study. Inductive data analysis was a vital part of both the selection of subsequent participants and the constant building of grounded theory [Glaser & Strauss, 1967]. The emergent design [Lincoln & Guba, 1985] of individual data collection tools was based on the analysis of preceding data and the identification of concepts and ideas, which needed further and deeper investigation. This process produced individual case studies, which were reported back to research participants and discussed with the researcher. From analysis of these individual case studies, cross-case themes were identified which provided grounded theory to be transferred from the local to the global level [Deem, 1998]. The following model has been adapted from the work of Lincoln and Guba [1985].

However, there is a need to underpin the research with a sound conceptual framework developed from theory grounded in earlier investigations [Lincoln & Guba, 1985]. This could then be used to develop a strong theoretical base; a collection of signposts that alerted the researcher to established concepts without excluding the emergence and development of unforeseen issues. Following the advice of Wilson [1994] and Westbrook [1993], the theoretical base for this research was drawn from multi-disciplinary exploration. The conceptual framework of the study was developed by integrating research from, educational psychology, information science, human computer interaction and learning theory. This type of in-depth, longitudinal study, taking a constructivist approach to the research, although becoming more common, is still unusual in LIS.

9.2 Information behaviour

In order to examine the role of information in the provision of learning opportunities it was necessary to develop a conceptual framework. This provided signposts for the collection of primary data for this study. Models of information seeking behaviour were investigated in detail and focused on work by Kuhlthau [1989 & 1991] and Pitt [1995] to provide insight into the information behaviour of young people. Ellis has carried out extensive research, taking a grounded theory approach, into the information behaviour of academic researchers

in a number of disciplines [Ellis, 1993; Ellis & Haughton, 1997]. Although the subjects of these studies may be expected to exhibit more complex information seeking behaviour, the methodological approach has informed this research. The 'PLUS' model described by Herring [1996] was used as a framework for examining the presence of information skills amongst the young people in this study. Other researchers have studied the information-seeking behaviour of students within specific electronic environments excluding, by design, all other information resources. [Borgman, 1995; Large, 1995; Marchionini, 1995; Neuman, 1995. & Yuan, 1997]. Other studies have concentrated on various aspects of the individual student's social and personal environments. Burdick [1995], Ford & Miller [1996], Jacobson [1994] and Poston-Anderson & Edwards [1993] all considered the impact of gender issues on information use. Influences of social class and race on information use have been examined by Martinez [1994] and Sutton [1991]. As Yuan points out; 'most end-user studies aimed at searching behaviour have focused on descriptions of behaviour or performance on a particular set of tasks' [p. 219]. There are few which focus on natural behaviour in the entire information environment of the individual [Williams, 1999]. Opinion of the effect of the tool used to provide and access information on learning is divided. There are those who believe that 'media are mere vehicles that deliver instruction but do not influence student achievement any more than a truck that delivers our groceries causes changes in our nutrition' [Clarke, 1989, p445]. Research has indicated that learning and cognitive development are intricately linked to opportunities to process and interact with relevant information and the medium used to deliver this information may well have an impact on these opportunities. [Borgman, et. al. 1995; Hiltz, 1993; Kozma, 1991, &Yang, 1997]. From this review of information behaviour research a framework of cognitive signposts was to developed which identified four main types of potential negative barriers to, or positive drivers for, the role EIR in the provision of learning opportunities. Those variables were; **Technological, Organisational, Social, Cognitive, Affective.** This was the framework which guided the empirical data collection in relation to information seeking behaviour although care was taken not to allow these signposts to restrict any new evidence emerging from the empirical data.

9.3 Learning opportunities.

As previously stated access to information and the information itself are vital components in the learning process. Access to learning opportunities and the motivation to utilise that access is vital if the full potential of the individual is to be reached. The delivery of library and information services in schools, of which electronic resources is a part, has become entrenched in fundamental beliefs established long before the introduction of multimedia to schools [Papert, 1996]. Ranson [1992] states that there is 'a need to break away from such rigid delivery systems' [p.74] but before radical changes can be implemented it is vital to study the alternatives and ensure that they do indeed offer a better future.

An effective and efficient system of provision, organisation, management and utilisation of all the learning resources in a school, including electronic information and awareness of other collections of resources outside of the school is essential. All schools need to be aware of their requirements for such a system and how that system will operate for the good of the school as a whole and all individuals within that school. It is vital to determine the role EIR can play in the provision of, and access to, a learning resource and the value it has to the individual.

There is some indication from past research that access to EIRs, in its many forms from physical to intellectual access, does have a role in the affordance of learning opportunities. Affordance refers to the opportunities and results that are made possible by features inherent in the technology. This does not imply that the technology itself brings about these opportunities and results [Janassen, et al, 1994]. It is not possible for any technology alone to provide these opportunities. Human interaction with the technology is needed to achieve any perceived or actual affordance. James Gibson first introduced the theory of affordance in 1977 [Gibson, 1977 & 1979]. Gibson's theory of affordance states that 'the affordance of anything is a specific combination of the properties of its substances and its surfaces taken with reference to the animal' [Gibson, 1977 p45]. Here Gibson uses 'animal' to mean animals in general or a specific species of animal.

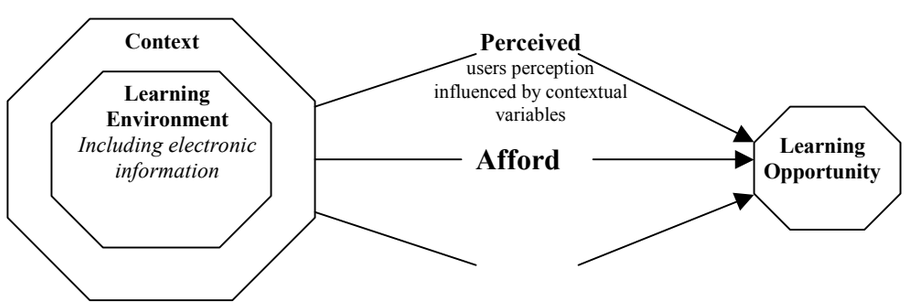

Figure 9-1 The provision of learning opportunities

There is potential for diverse application of new technologies in education. The constructivist approach to learning highlights some of that potential. First there must be motivation within the teaching profession to support and encourage the use of new technologies. Tapscott claims that the capabilities of educational technology are still not being realised due to a firm adherence to traditional broadcast methods of instruction [Tapscott, 1998]. Although the rhetoric of advocates of technology may suggest that technology itself can drive or cause change, research indicates that this is not the case [Carr, 1997]. 'Old habits die hard, however, and we should not expect new working relationships to be forged simply because a computer is on the workbench' [Underwood & Underwood, 1990 p. 165]. The school has proven to be a durable institution and it is unlikely that it will change drastically due to the introduction of new technology. Research has shown that school use of technology generally fits into pre-existing routines [Brown, 1994, Olsen, 1988, Papert, 1996]. Riffel and Levin [1997] found that 'it takes time for technology to be accommodated to existing practice, and even longer for existing practice to change so as to take advantage of the new potential of the technology' [p.51]. Teachers, adults who are at best ‘naturalised citizens’ in the ‘computer culture’ [Turkle, 1995] often reinforce existing practices by fitting the technology into that practice. Educators express a sense of the potential of new technologies in education, but few have begun to explore that potential fully [Riffel & Levin 1997 p.51]. Phrases such as ‘information superhighway’ and ‘home page’ reflect a tendency to describe innovations in terms of familiar concepts, even when those terms fall short of accurate description [Bailey, 1996]. Often the student knows more than the teacher, teachers, who are themselves learners, are very often uncertain about how and when to offer assistance to students. Teachers frequently find themselves in unknown territory and this can lead to a sense of insecurity [Fisher, 1993]. Becker [1999] found that

constructivist teachers allowed student use of technology three times more often than traditional teachers. He also found that the reasons teachers gave for holding to the traditional broadcast method of teaching was due to concern about state tests and standards which left little time to focus on more student-centred approaches to teaching and learning.

9.4 Empirical research findings

Klobas [1995] claims that 'electronic resources have characteristics of both information sources and information technology,' and that 'use of electronic resources can be explained by a combination of factors included in information use studies and technology use studies.'[p. 97] This research has identified four major groups of variables which determine the impact that access to EIRs can have on learning opportunities for the individual: Technological and organisational variables which relate to the physical components necessary to interact with EIRs. Cognitive variables relate to knowledge of the resources, and perception of the processes involved. This is followed by the ability to apply this knowledge and perception to the use of individual EIRs. Affective variables which are concerned with the individual's feelings and emotions about, and attitudes towards, the use of the resources, the information, the location, and the purpose of their own searching behaviour. Social variables, which are primarily concerned with economic factors, images of electronic information, peer interaction and gender issues.

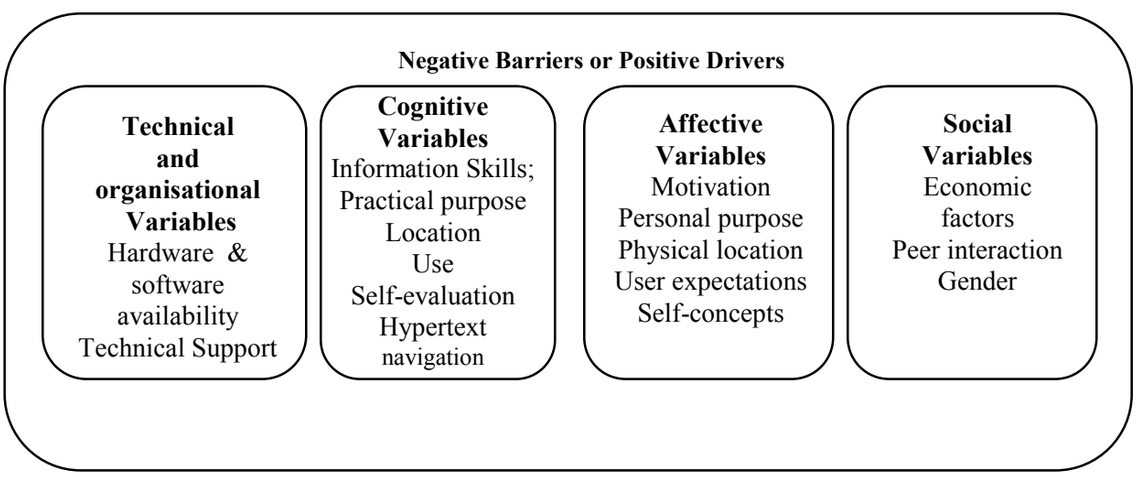

Figure 9-2 Variables impacting on user interaction with electronic information

9.4.1 Technical and organisational variables

The impact of EIRs on learning opportunities is initially dependent upon the level of physical access to the hardware and software necessary to interact with the specific resource. Having physical access not only includes the availability of hardware and software, it also relates to the user having the skills to use these resources and an appropriate level of technical support. The technological variables identified by this research as an influence on interaction with electronic information were *hardware and software availability* and *technical support*. All of the young people in this study had physical access to some computer hardware and software, but there was little consistency in the level of physical access. There was evidence of vast disparity in availability in the home, in the public library, and within and between individual schools. The young people in this study had very different levels of physical access to computer hardware in their own local libraries. Some had no access at all whilst others were members of a library which has been nationally acclaimed for the public electronic information service they offered. Access to computer hardware in the home was not available to all of the young people in this study and there was considerable variation in the type of hardware owned or used privately. The young people in this study had their own perception of levels of availability, and it was their perception that was the focus of inquiry.

Hardware availability in school is dependent on a number of issues relating to the emphasis placed on the resource by management, availability of funding and technical expertise available within the location. Although policies on the provision of these resources did exist in individual institutions there was little consistency across authorities and very often policies within individual institutions were not followed. Those who had home access were very aware of the disparity of standards claiming that they prefer to use them *'at home because you can learn to do things by yourself and it's like easier to use. Normally the stuff at home is a lot better than it is at school.'* The opinion was that they could *'get more stuff, and normally the quality of things is better, because you can get upgrades of Microsoft and stuff like that and normally at school you don't have that.'*

Although physical access may be available, very often it was at a cost. This caused frustration to the participants in this study. Those who did not have access at home were very often the same people who could ill afford to pay the cost of access in the school or in the public library. Connell and Franklin [1994] claim that 'the greatest barriers to the

Internet are economic and geographic.' They go on to say that it 'is not just overcoming the inability to pay for access but also the inability to afford the necessary computer equipment and training to use it.' [p.614] Schools and the public library may well be in the best position to overcome these barriers but this research indicates that these barriers still inhibit access. It appears that this is still not the case; '*Well I did at first, but now you have to pay £2 for half an hour after 4 o'clock and I can't so I don't bother going on now… Anyway, after 4 o'clock you have to pay to use the computers and I cannot afford it, I spent all my paper round money one week but I'm not doing that again. It was when we first got the new computers and everyone wanted to use them, it's not worth using all your money.'*

The availability of computer hardware to the young people in this study varied greatly and was dependent upon socio-economic factors such as; the school they attended, their local public library authority and the financial status of their families. It would still appear to be possible for young people to reach the end of compulsory education without having had any structured access to EIRs. Hardware being physically present is not sufficient to claim access.

9.4.2 Cognitive variables

Intellectual access to, and use of, EIRs is dependent upon a number of factors. The success of these resources in the learning environment is directly linked to the individuals' capacity to acquire and apply the skills demanded by the resources. This research supports claims that information skills training would appear to be more relevant to these young people now than at any other time. The proliferation of accessible information has placed an even greater demand on the individual to acquire and apply these skills on a daily basis across the entire spectrum of information seeking [Johnson, 1995]. Some past research claims that the same skill used to locate information in the print based environment can be used to locate information in the electronic environment [NCET, 1993]. This research supports claims that those skills cannot always be transferred to the electronic environment [Yang, 1997]. Students are aware that they are not equipped with the appropriate skills to maximise the value of electronic resources; '*I'm not sure I'm doing things the right way, I get there in the end some of the time but it should be better than that shouldn't it?'* Search strategies created a great many problems for the participants in this study. They appeared to have little knowledge of standard search procedure. '*It's easier, it's much more user friendly, because like in a book you've got say twelve volumes in an encyclopaedia of science, you have to go*

through each volume of the encyclopaedia looking through the index trying to find where you want, trying to find the page, and all that and having to search for it. But on the Internet you just click on the word you want and most of the time you do get what you want but like I said you have to go through a few steps but its quicker than going through all the books'. This supports evidence from other research that students need to be focused about a specific task and devise a strategy before they begin [Spaven, 1999].

Navigating the three-dimensional hypertext environment would not appear to be the liberating experience it is often claimed to be. Often it can be confusing, as one participant noted; '*I sometimes get quite lost if I've been on loads of different pages, I can never remember where everything is and I get really fed up.'* It creates barriers to access that need to be addressed before it can actually begin to provide the benefits that may be possible in the provision of learning opportunities to these young people.

There are also issues relating to the quality and quantity of information which create their own problems and increase the pressure on the individual to act as their own information filter, a role that has traditionally belonged to publishers, librarians and teachers. '*Well on the Internet I think its more what people put in as themselves than what actually happened, like they might be supporting a view or something, but with like the text books they are always giving you everything you need to know.'* New technologies also allow for new forms of presentation of information, providing the individual has the ability to use these technologies. There is increasing disparity between those who have the technical *know how* and those who do not. The highly demanding and complex cognitive requirements of these resources are often overlooked or even dismissed by those promoting the resources as an effective tool. This can have a negative impact on the use and perception of resources such as the Internet and CD-ROM.

There appeared to be very little formal instruction given to the young people in this study by teaching staff, the general opinion was that access and using electronic information was *quick* and *easy* not requiring any structured teaching. Teachers often gave instructions for pupils to 'look on the computer' without specifying which resource to use or how to use it. When asked about this, teaching staff were open and frank about their own lack of clear understanding. They had an 'idea' that the information would be available in electronic form

but they could rarely be more specific. Those with good search skills had acquired those skills by their own efforts outside of any formal, school-based training; '*Everything I know I learnt at the course I did on Saturday mornings at the college, my Dad paid for that, nobody ever showed me how to use anything in here, they just set it up and that was that. We never had training on it or anything everyone says the Internet is easy, well if its so easy I wish they would all stop asking me how to use it when I'm trying to get on with my work.*' On the occasions where students were directed to a specific resource for a specific purpose there was successful incidents of discovery and use.

9.4.3 Affective variables

The belief that all young people are familiar with new technology and have the intellectual ability to apply this technology is a very common assumption. This brings with it a great deal of responsibility for young people and creates standards they are not always able to live up to. The very nature of the resource brings with it a high level of motivation. As one participant said; '*Everything looks better on the computer, its more interactive, you can jump around and have more fun looking for things.'* Media hype, the image of the computer as a gateway to all knowledge and the fashionable nature of the medium all encourage use. The nature, location, and type of resource provision however temper this. These young people find electronic resources fun to use, interesting and more exciting than traditional resources. '*I get a bit frustrated at times but it's still loads better than looking through all the books, I spend longer looking for things but I'd give up if I was using the books in the library because I'd get bored quicker. It's more fun using the computer.'* They use the resources for project based research and recreational activities, however this motivation is often very fragile. They are quickly discouraged when those resources do not respond as expected and do not perform as promised.

The location of electronic resource access affects the users feeling towards both the technology and the information. The location of access was of great significance to these young people. There was strong evidence to suggest that home was the preferred location for those young people who had their own computers; '*At home, because you can learn to do more things without people telling you to do this and do that. It better because you don't get to do as much at school with the computers.'*

There needs to be some alignment between user expectations and system capabilities in order to reduce the feeling of individual failure that is often promoted by these resources. The consistent hype concerning the capabilities of electronic resources has created a new mythology amongst young people that exaggerates the individual's inability to use these resources profitably. '*I get fed up of it. Sometimes I just give up, I know it's doing a lot of work but that doesn't help me when I'm sitting here waiting for it. You start to wonder what you've done wrong and if I have to go back and do it again I'd rather not bother.'* The individuals' perception of their capability influences the impact of access to electronic resources in relation to learning opportunities.

9.4.4 Social variables

Economic factors play an important role in access to EIRs. Access to these resources is often highly dependent on the individual's ability to pay for access and training. Acknowledgement of this situation by Central Government would indicate that the disparity of access between those who can and cannot afford access and training is likely to decrease. However, home access, although of great significance, is only facet of this issue, public access is also highly significant.

Peer interaction can be placed along a continuum that is governed by the distribution of knowledge amongst the young people themselves. One extreme pole is peer tutoring, when one of the pair or group has more knowledge than the others, not necessarily a great deal more but sufficient to allow them to guide and instruct their peer group; '*it's good fun and I'm not good at much so when I am it feels great.'* The other extreme of the continuum is peer collaboration when knowledge is distributed evenly between the pair or across the group. Both extremes appear to be of great benefit in the use of EIRs. Peer interaction allowed these young people to reverse the traditional pupil-teacher roles and place themselves in a position to both ask and answer questions, to give and follow directions and to speak in their own language about their own concerns. '*It's better when I go on with Katie, we have a good laugh trying to find the answers and I don't feel as stupid when we both keep getting loads of hits. We always find something but it never to take as long as this'.* Unless actively discouraged by the environmental setting peer interaction takes place as a naturally occurring phenomena. The interactions observed in this study were rarely, if

ever, artificially instigated, they happened as a natural solution to a problem or a social event.

Gender issues still appear to be of significance in relation to the impact of access to EIRs on learning opportunities, although this research would suggest that this is more to do with individual perceptions than with individual school or public library authority policies; '*I haven't got a clue how it all works, some of them* [boys] *do, you know, they spend hours just figuring out how it all works but that's because they're techno's. I'm not, I like the Internet but I don't care what's going on inside.*' It would appear to be a social characteristic that has become ingrained in the individual, however the planning and delivery of EIRs could be instrumental in changing these perceptions.

The impact that access to EIRs can have on learning opportunities for young people is still dependent upon social variables. These variables need to be considered when planning and designing the delivery of information skills training and when planning for the provision of these resources for young people. There is evidence to suggest that, although many of these issues have been recognised, there are still young people who remain in danger of becoming disenfranchised because of their limited access to information.

9.5 Summary

The nature of this research does not allow for generalisation of findings but there are global issues that have become apparent from a local level. These issues can inform practice at a wider level and suggest ways forward in the management of EIRs.

The disparity between 'information rich' and 'information poor' is increasing. These young people demonstrated that home access leads to a better understanding of EIRs and increased confidence in the use of those resources. Some of the participants in this study accepted that they would never have home access to a computer. They hoped they would but were aware that their economic situation would not allow for this. They all aspired to owning their own computer and said that eventually they would but not in the near future. It would appear that those who are more proficient in the use of electronic resources are also more privileged with levels of access. Not only do they have home access, but teaching and library staff are more inclined to allow greater levels of access to the more competent users. EIRs have

become swathed in symbolism and surrounded by there own mythology. Myths have been created and compounded by marketing strategies, imaginative exaggeration and distorted perceptions of reality. Training and education in the use and application of these resources are necessary to develop a clear understanding of the value of these resources on learning opportunities to young people.

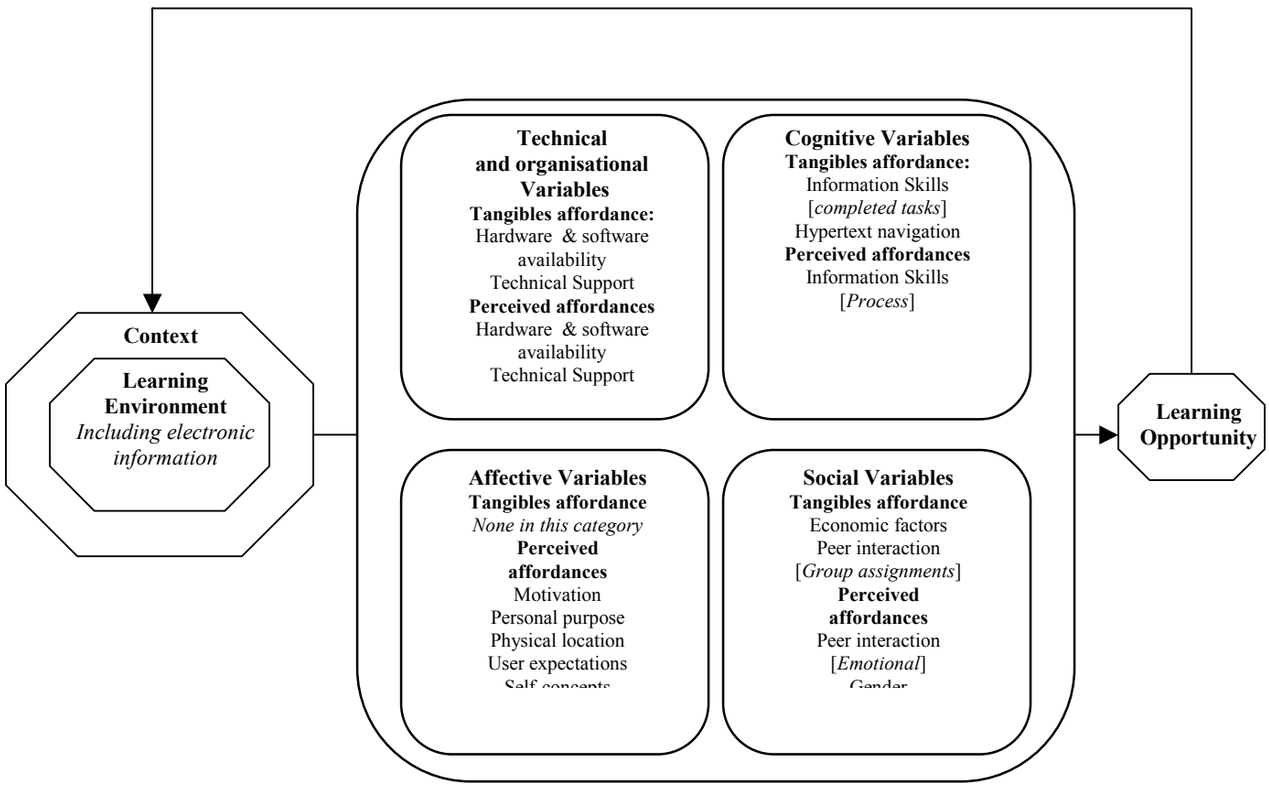

Figure 9-1 Potential affordance of electronic information resources in the creation of learning opportunities.

Figure 9.2 illustrates the potential positive drivers or negative barriers which can impact upon the creation of learning opportunities through access to electronic information resources. EIRs have the potential to afford learning opportunities but only when the individual issues illustrated in the model are addressed. Within the four major categories of variables are the individual issues identified by this research has being of significance to young learners. These issues can often be clearly classified as either a perceived or a tangible affordance, but some are actually both. They all have the potential to become a negative barrier or a positive driver [affordance]. The construction of a learning environment that ensure these are affordances and not barriers is the responsibility of all those who design and

control that environment. This includes, schools, public libraries, home and in fact, any location that claims to provide access to information for the purpose of learning.

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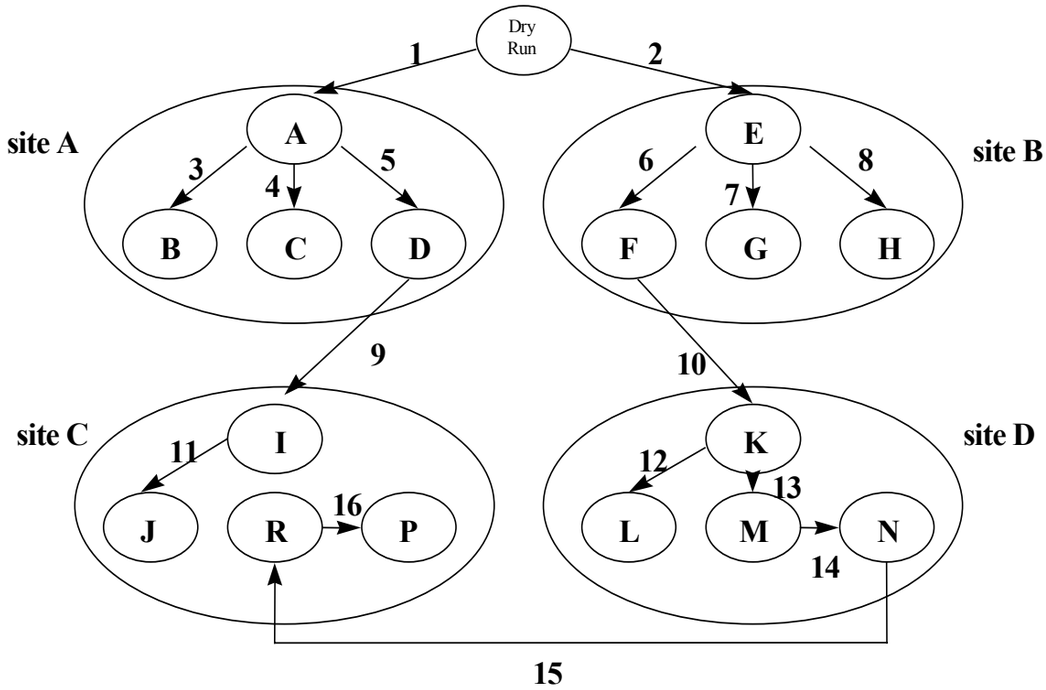
Appendices

Appendix 1
The sample map.



Path.		Criteria.
1	**Leading to:**	**Site A** **Annie** 1. Female. 2. Access to electronic information resources at home. 3. Access to electronic information resources at school. 4. No access to electronic information resources at Public Library. 5. No access to electronic information resources at other locations. 6. Never uses of the Public Library. 7. Never uses the School Library. 8. Regular use of the Internet. 9. Parents very IT literate. 10. Average academic achiever. 11. Some library skills training.
2	**Leading to:**	**Site B** **Eddie** 1. Male. 2. Access to electronic information resources at home. 3. Access to electronic information resources at school. 4. Access to electronic information resources at Public Library. 5. Access to electronic information resources at friends' homes. 6. Rarely uses the Public Library. 7. Regularly uses School Library. 8. Regular use of the Internet. 9. Parents very IT literate. 10. High academic achiever. 11. Trained in library skills.
3	**Leading to:**	**Bill [Site A]** 1. Male. 2. Access to electronic information resources at home. 3. Access to electronic information resources at school. 4. No access to electronic information resources at Public Library. 5. Access to electronic information resources at friends' homes 6. Never uses the Public Library. 7. Regularly uses School Library. 8. No access to the Internet. [Will change during the course of the research with introduction of school access.] 9. Parents have no IT skills.

10. Average academic achiever.
11. No knowledge of library skills.

4 **Leading to:** **Cath [Site A]**

1. Female.
2. Access to electronic information resources at home.
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. No access to electronic information resources at other locations.
6. Regularly uses the Public Library.
7. Regularly uses School Library.
8. Some access to the Internet at home. [Will change during the course of the research with introduction of school access.]
9. Parents very IT literate.
10. High academic achiever.
11. Good library skills.

5 **Leading to:** **Dave [Site A]**

1. Male.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Never uses the Public Library.
7. Regularly uses School Library.
8. No access to the Internet. [Will change during the course of the research with introduction of school access.]
9. Parents have no IT skills.
10. High academic achiever.
11. Some library skills training.

6 **Leading to:** **Fred [Site B]**

1. Male.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Regularly uses the Public Library.
7. Regularly uses School Library.
8. Access to the Internet.
9. Parents have no IT skills.
10. Low academic achiever.
11. Some library skills training.

7 **Leading to:** **Gwen [Site B]**

1. Female.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Access to electronic information resources at Public Library.
5. Access to electronic information resources at Grandparents' home.
6. Never uses the Public Library.
7. Never uses School Library.
8. Some access to the Internet.
9. Parents no IT skills. [Grandparents do.]
10. Low academic achiever.
11. No library skills training.

8 **Leading to:** **Gwen [Site B]**

1. Female.
2. Access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Sometimes uses the Public Library.
7. Regularly uses School Library.
8. No access to the Internet.
9. Parents no IT skills.
10. Average academic achiever.
11. No library skills training.

9 **Leading to:** **Site C**
Ian

1. Male.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Limited access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Regularly uses the Public Library.
7. Regularly uses School Library.

8. Access to the Internet.
9. Parents no IT skills.
10. Average academic achiever.
11. Some library skills training.

10 **Leading to:** **Site D**

Karen

1. Female.
2. Access to electronic information resources at home.
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. No access to electronic information resources at other locations.
6. Never uses the Public Library.
7. Regularly uses School Library.
8. Access to the Internet.
9. Parents very IT literate.
10. High academic achiever.
11. Some library skills training.

11 **Leading to:** **John [Site C]**

1. Male.
2. Access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Limited access to electronic information resources at Public Library.
5. Access to electronic information resources at local college.
6. Never uses the Public Library.
7. Regularly uses School Library. [Only for access to electronic resources.]
8. Access to the Internet.
9. Parents no IT skills.
10. Average academic achiever.
11. No library skills training.

12 **Leading to:** **Lee [Site D]**

1. Male.
2. No access to electronic information resources at home. [does have a computer.]
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Never uses the Public Library.
7. Regularly uses School Library.
8. Access to the Internet. [Friend's house and school]
9. Parents not IT literate.
10. Average academic achiever.
11. Some library skills training.

13 **Leading to:** **Matt [Site D]**

1. Male.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Regularly uses the Public Library.
7. Regularly uses School Library.
8. Access to the Internet. [Friend's house and school]
9. Parents not IT literate.
10. Low academic achiever.
11. Some library skills training.

14 **Leading to:** **Nicola [Site D]**

1. Female.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. No access to electronic information resources at Public Library.
5. No access to electronic information resources at other locations.
6. Rarely uses the Public Library.
7. Regularly uses School Library.
8. Access to the Internet. [School only]
9. Parents not IT literate.
10. Low academic achiever.
11. Some library skills training.

15 **Leading to:** **Ruth [Site C]**

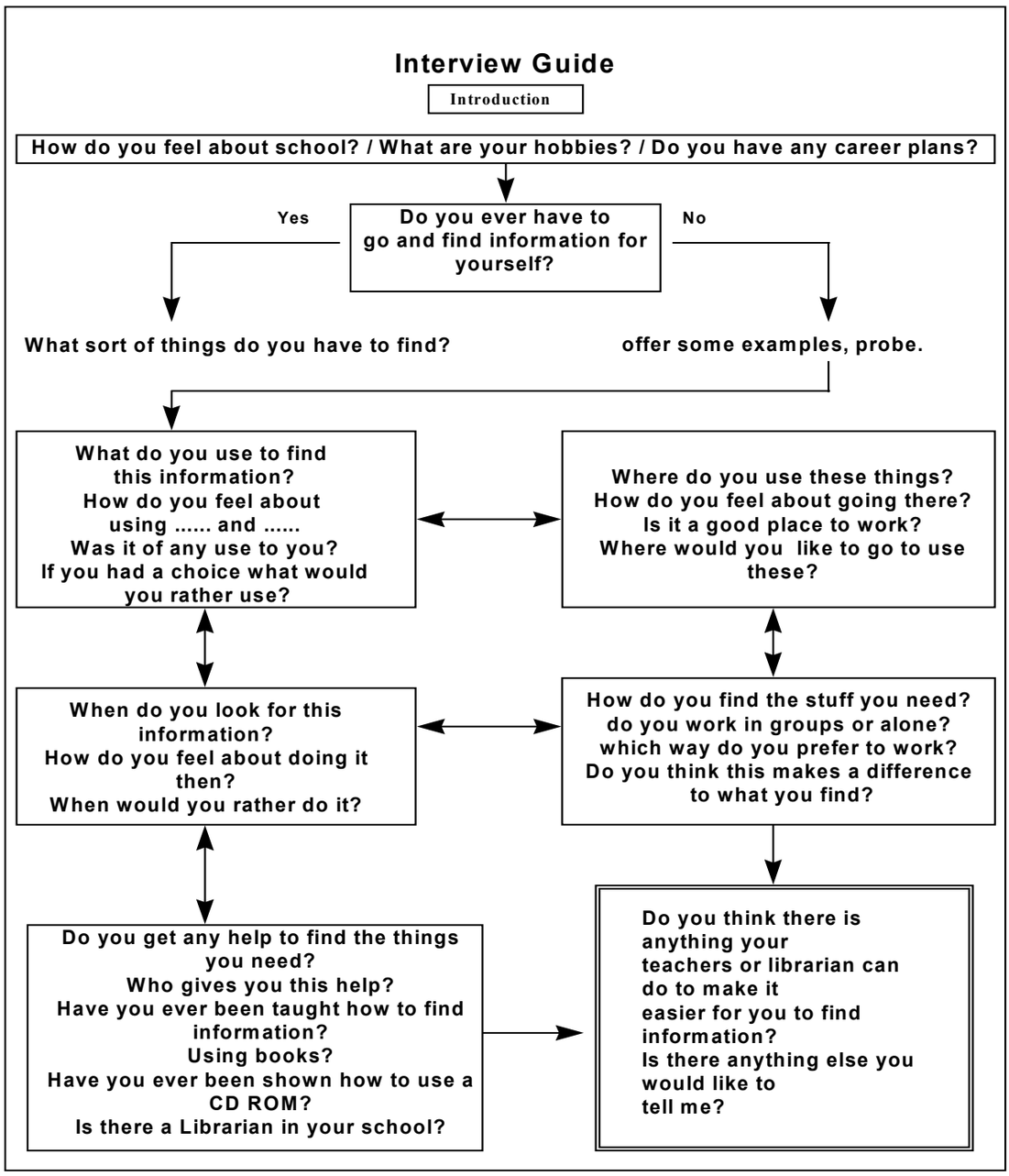
1. Female.
2. Access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Access to electronic information resources at Public Library.
5. No access to electronic information resources at other locations.
6. Regularly uses the Public Library. [Electronic resources and fiction material only]
7. Regularly uses School Library. [Electronic resources and fiction material only]

8. Access to the Internet.
9. Parents IT literate.
10. Average academic achiever.
11. Some library skills training.

16 **Leading to:** **Pam [Site C]**

1. Female.
2. No access to electronic information resources at home.
3. Access to electronic information resources at school.
4. Access to electronic information resources at Public Library.
5. Access to electronic information resources at friend's home.
6. Regularly uses the Public Library. [Electronic resources and fiction material only]
7. Regularly uses School Library. [Electronic resources only]
8. Access to the Internet.
9. Parents not IT literate.
10. Average academic achiever.
11. Some library skills training.

Appendix 2:
Interview Guide.



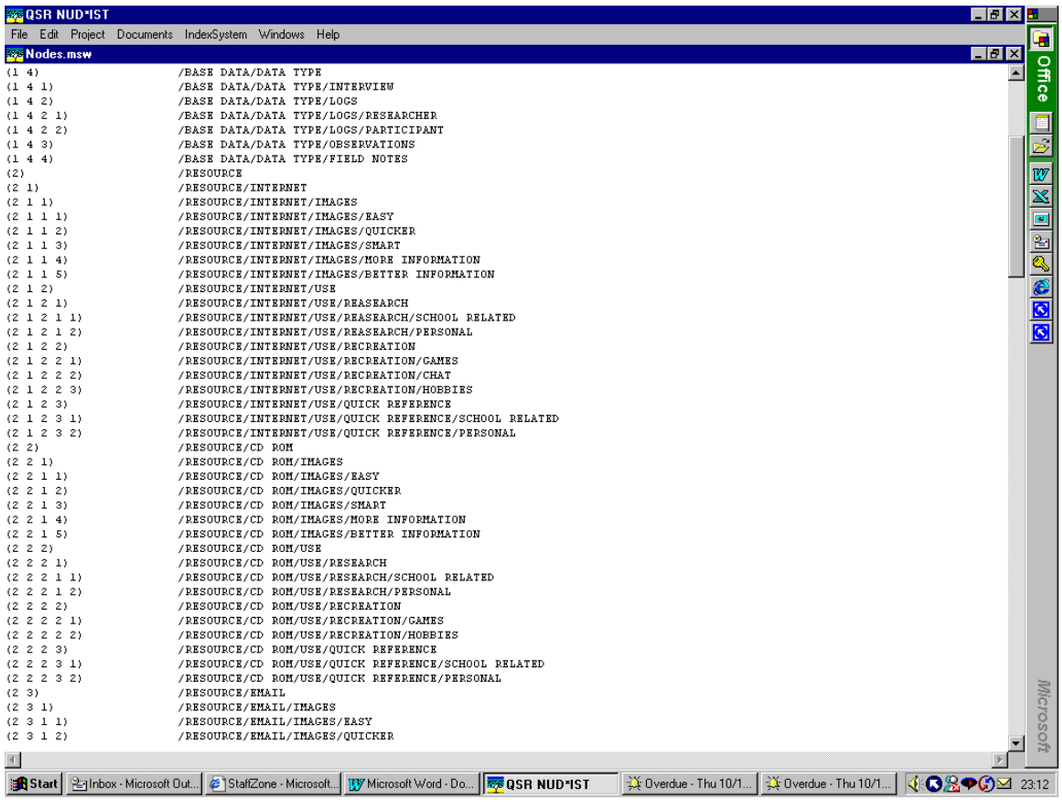
Appendix 3:
The audit trail.[4]

Classification	File type	Evidence
Raw Data	**1. Electronically recorded material** Audiotape transcripts Researchers Journal Participant diaries Minutes from tutorials **1. Field notes** Interview records Observation notes Participant diaries **2. Unobtrusive measures** Public records Policy documents Private records Samples of individual work	a. Dialogue of social interactions b. Interview transcripts. c. Descriptions of events, feelings and responses of participants. d. Descriptions of environments, participant characteristics, behaviours of individuals. e. Written work of individuals f. Procedures and policies g. Daily routines h. Personal reflection
Data reduction and analysis	**1. Electronically recorded material** Field note transcripts Descriptions QSR NUD.IST index tree **2. Summaries** Units of information: Themes Ideas behaviours Concerns **3. Theoretical notes** Emerging hypotheses New concepts	a. Summary of interview transcripts b. Building of categories for analysis c. Developing themes for further investigation d. Coded transcripts e. Memos in NUD.IST database
Data reconstruction and synthesis	**1. Index tree** Themes Relationships **2. Description of cases** Participant profiles Interpretations Discussion of emerging themes **3. Cross-case analysis** Presentation of themes Connections with previous research Integration of concepts within conceptual framework **4. Findings** Suggested ways forward Reflection	a. NUD.IST hierarchy of categories b. Links across and through hierarchical structure c. In-depth description of individual participants d. Explanations of connections e. Final thesis
Process notes	**1. Methodology** Procedures, routines, strategies. **2. Trustworthiness** Credibility Dependability Confirmability	a. Daily activities b. Notes from supervisory meetings c. Decision making d. Sampling e. Peer debriefing f. Member checks g. Prolonged engagement h. Triangulation checks

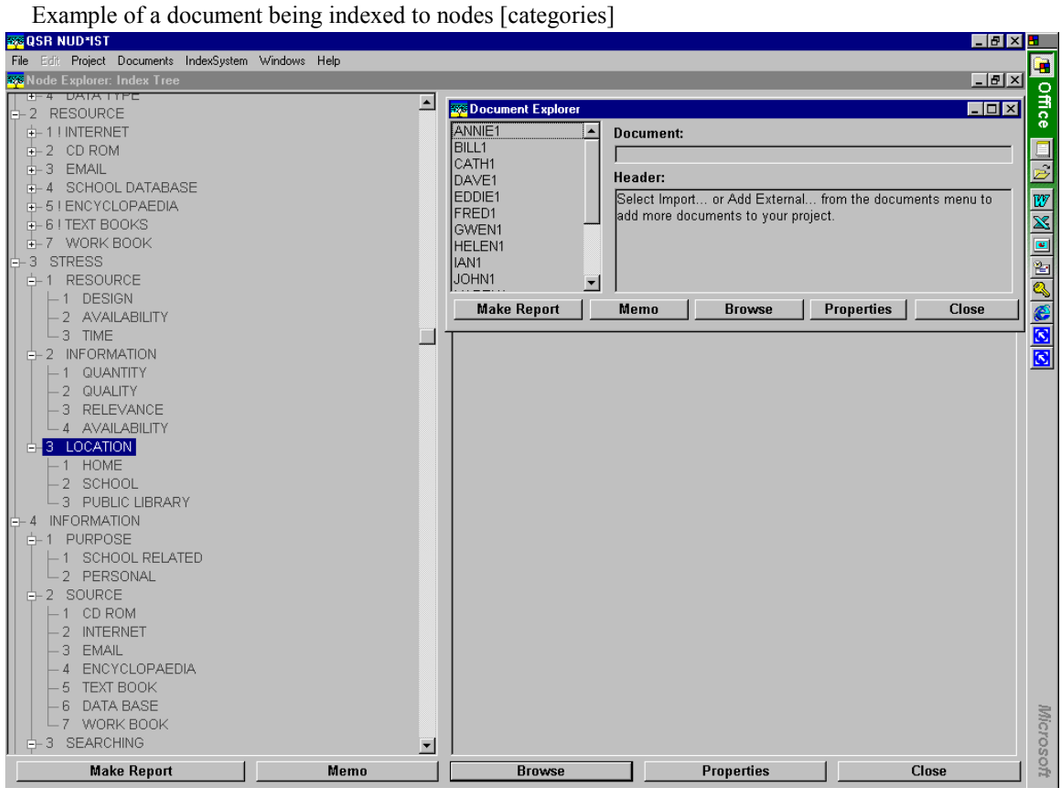
[4] This design follows that of Edward S.Halpin as cited in Lincoln & Guba, 1985 Appendix A.

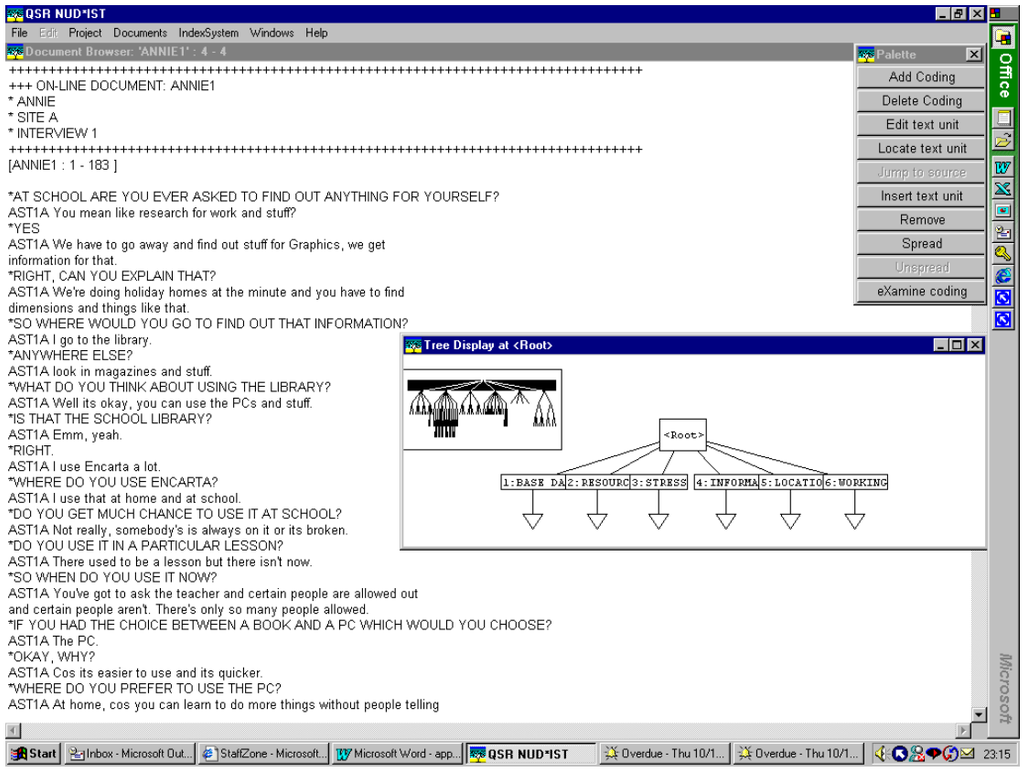
Appendix 4:
Q.S.R. Nud*ist database

Example of the index tree listing categories and sub-categories

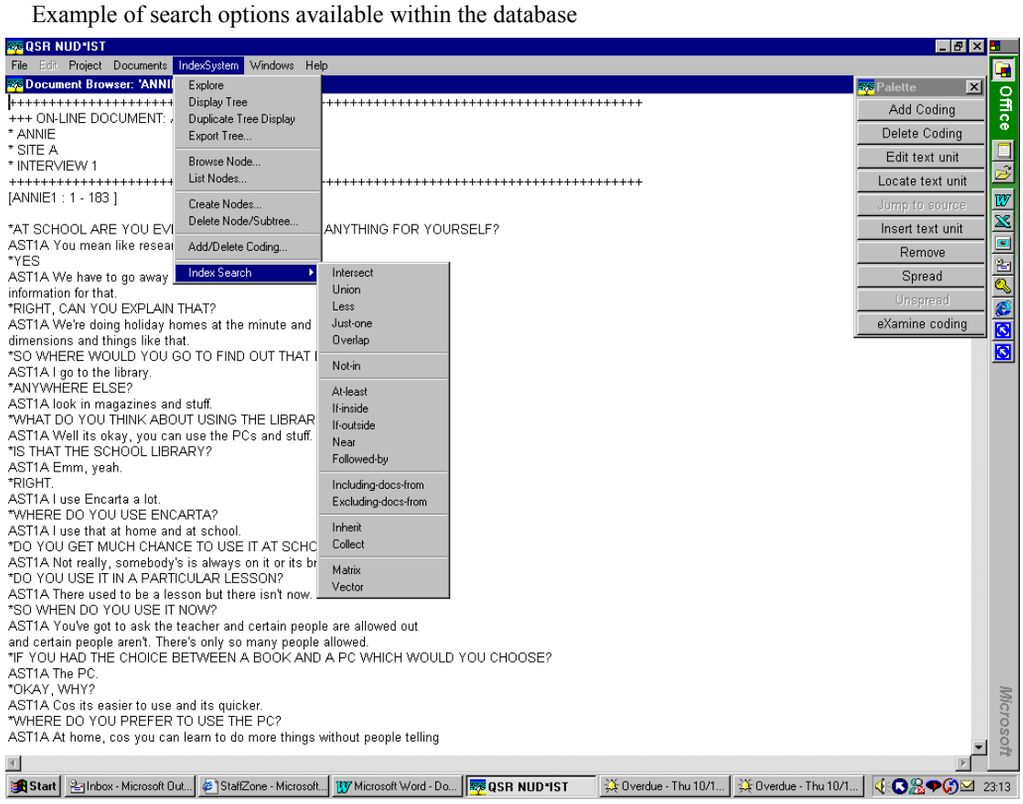


Example of Index tree hierarchy and document exploration.
Example of a document being indexed to nodes [categories]





Example of search options available within the database



Appendix 5:
Participant Profiles from Site A

ANNIE.

Annie was an only child, the family lived in a mid-terraced house situated between the village shopping centre and a small council estate. The family unit was made up of Annie, both parents and the maternal Grandmother. Both parents were in full time employment, the mother worked in administration at a local hospital and the father ran a small business with one partner. There was a feeling of financial security in the household, Annie appeared to be surrounded by both financial and emotional support. Annie had just turned fourteen at the start of the field work, she appeared quite shy in the beginning, always waiting to be asked, never volunteering an opinion until one was sought. This was a characteristic that changed as the research progressed, Annie became much more comfortable in talking about herself, and often offered information she thought would be useful.

Annie had her own bedroom and the downstairs front room of the house was also thought of as 'hers', this room housed the family PC and was arranged as a sitting room/study. From the PC in this room Annie had access to a great many electronic information resources; CD ROM, interactive CD ROM, Internet and email. She had unlimited access, none of the resources had any restrictions placed on them relating to time of use or type of site accessed. Both parents were familiar with, and regular users of, the technology and were prepared to trust Annie when she accessed the Internet.

At the beginning of the research Annie was not a member of the public library and never used the local branch, her reason for this was; 'books were old and useless', 'the librarian' was 'horrible', 'all the [idiots] hang around outside after it gets dark.' At this time Annie had no access to electronic information in the public library, and limited access at school. She felt that school could offer a great deal more than was available at this point, she had been very disappointed when she had moved up from her middle school to the high school. Provision of electronic resources had been better in the middle school, she had not been expecting this and felt very let down. She was also dissatisfied with the priority given to some pupils over others, those whom she referred to as the 'school swots' appeared to be allowed a much higher level of access to the resources available and on a more regular basis. On the few occasions when they were allowed open access Annie said that the boys always monopolised the available PCs and constantly tried to 'hack' into the school system, which often led to the entire class being banned for a certain period.
During the course of the fieldwork the new school library was opened and the new information network was introduced. After the introduction of the new network the new library became a regular part of Annie's school life. She used the library at least twice a week and her opinion of school, which was extremely low at the beginning of the research, had risen considerably.

Annie had never been shown how to use the library and she said that the 'Librarian' just 'does your books and tells you to be quiet, that's it'. After the new library was opened and the new Librarian was in post, Annie had a change of attitude. She said; 'but its better now, the new Librarian she helps you now rather than the teacher showing you, but she can only help you so much because she has so much to do.' Annie mentioned the new Librarian a number of times when explaining how she went about finding things in the new library. This, and the fact that there was now such a high level of electronic information resource provision had warmed her to her school environment, although there was still a great deal of animosity towards some of her teachers.

Annie preferred to access electronic information resources at home and she preferred work that allowed her to express her own views and carry out her own research. Geography was one of these. These were the subjects she regularly attained higher marks in, she was very keen to produce examples of her work in these subjects during interviews and observations. In Geography Annie was given a great deal of scope to carry out independent research, she had produced some examples of projects which contained vast amounts of information and appeared well presented. Using the Internet had encouraged her to spend much longer selecting, retrieving and evaluating information because she felt she 'had to' because it was not in a book. She said '*you can just copy stuff out of the book because you know it must be true, it's not like that on the Internet*.' When asked if anything she had studied at school had encouraged her to do additional work she again referred to Geography but also added Business Studies. Graphics was another subject which Annie enjoyed and again she found the Internet a valuable source of information although she did go to printed sources first. This project showed a great deal of thought and effort, she had been given a very good mark and she had enjoyed producing

it, she had also retained much of the information as she was able to discuss without referring to the written work.
The Internet was Annie's chief source of information, she found it easier and quicker to use than any other resources available to her. She rated books as possibly the worst source of information, finding them boring, hard to use and time consuming. Having said this, she frequently spent over an hour and a half searching on the Internet, sometimes without much success. She said this did not matter as it was 'fun' and 'interesting', she would never spend an equal amount of time searching in books because 'there's nothing really to hold your interest.' She preferred CD ROMs to books but did not rate them as highly as the Internet, she found CD ROMs harder to use because they used more complex terms and searching can often be very difficult. Annie often got frustrated at the time it could take to access many of the sites on the Internet. But this did not distract from her enjoyment of the medium, she said that it was just something you had to put up with and it was worth it in the end.

Annie, as a frequent user of chat lines, was aware that perhaps she spent too much time on this activity but she enjoyed it and her parents supported her. They were happier to have Annie at home where they could 'keep an eye on her'. Although use of chat lines is not permitted at school this does not deter many of the pupils, as Annie explained; 'you can get through it easily and that's all people do, you just make a backup screen and put that up when the Librarian comes and she doesn't know.' Such intense use of chat lines did impact on other areas of Annie's life, she was conscious of the fact that her use of 'digital shorthand' was extending into areas that called for more formal writing techniques.

Annie was a confident, semi-skilled user of electronic information resources but the lack of formal training was evident in her search technique. When asked how confident she was she had no hesitation in saying; 'Very, I'm used to it and I'm more comfortable than I am looking up stuff in books and in libraries.' She was frequently asked for help from her peers and she enjoyed tutoring them on the Internet and the use of search engines. It gave her a sense of achievement and encouraged her to investigate the Internet in more depth. Annie would carry out searches with confidence, she showed no concern for 'getting it wrong' because she knew she could always retrace her steps and try again. This was confirmed by all subsequent observations of Annie searching on the Internet from home and entries in her Search Log, which she maintained diligently throughout the research. She did spend a considerable amount of time refining her searches, time which could have been saved had she formulated some approach before going straight on the Internet.

Summary.
Annie had a very secure home background, as an only child, her parents admitted that she may be overindulged. This may have led to her having very high expectations which could not always be met outside of the home. This often led to frustration and anger which, in the case of her attitude to school, made her highly critical of anything that did not match up to her ideal. She was a semi- skilled and frequent user of electronic information resources with a high level of physical access.

Electronic information resources are a motivating factor in Annie's learning environment, she was very interested in subjects which allow her to investigate and evaluate for herself, a process which seemed to encourage knowledge retention. Although she used electronic resources regularly and was confident in that use, she appeared to lack any clear understanding of the search process. A great deal of Annie's success with these resources had more to do with the amount of time she was prepared to spend on them than with any clearly structured search strategy.

BILL.

At the beginning of the fieldwork Bill was 13 years old and in his first year at High School just going in to his second term. Bill lived in a small village a short bus journey away from the school, he had lived there all of his life and had the same circle of friends now as he did when he started primary school. Since coming to the High School his circle of friends has grown to include some new friends from neighbouring villages. Bill was a very private person and, although he always said he enjoyed being part of the research, he did not like to discuss personal issues unless he was absolutely sure they were relevant to the study. He gave little away without being specifically asked, it was very rare for him to volunteer information and group discussions were particularly difficult for him. He was the first to suggest that the logbooks were not working very well, although he was initially reluctant to say why.

Bill lived with his parents and an older brother who worked for a local tiling company, his father was an agricultural engineer and worked for a company that manufactures silo machinery. They were a close family, the brothers got on well and they also spent time with their extended family, many of whom lived in the same village. There was one PC in the home, which was located in the older brothers' room although it belonged to everyone. Only Bill and his brother ever used the PC, neither of the parents had any knowledge of the technology and they are not interested in learning about it. Bill said they 'don't use it and they haven't got much of a clue really.' They were very pleased that Bill was taking part in this research and frequently asked questions relating to the findings. Bill spent some time every night on the PC, usually playing games but he also played a lot of sport, he was a very keen footballer and an avid fan of his local football team. He played the bass guitar and spent a lot of time visiting friends, the social side of school was the most interesting aspect for him.

At the beginning of this research Bill was not a member of the public library, he did join the new library during the fieldwork but he said this was only because it was both the school and public library. He said he never read books at all, he used CD ROMs and the Internet for all of his information needs. Bill claimed that the information available on the computer was 'better' and there was more available than in books. He spent a great deal of time reading from the PC screen but he did not class this as 'reading', he associated *scanning* with a screen, he did not think it was possible to do the same thing with printed material.

Initially Bill claimed that he used Encarta for all of his information needs relating to school projects because. He said; 'I like Encarta, you get more information, better information'. He used Encarta for all of his school projects and homework, he never used printed material to support, confirm or supplement this information. Although Encarta was available in school, he preferred to use it from home. He also preferred home use because he enjoyed computer games and liked to end his sessions by playing one of the many computer games he had access to.

Bill was one of the first in his class to start using the Internet in the new library and he quickly began to show a preference for that over Encarta, his opinion was that 'the Internet is better than books and CD ROM's. It's not as complicated, its much easier to search.' He was very confident in the way he spoke about searching on CD ROM's and the Internet, however observations revealed that he spent a great deal of time searching both of these resources, often without much success but he never regarded this as a failure of the resource. He explained the lack of information he received as being the result of his lack of practice or because he had never searched on this topic before. On one occasion he spent the entire lunch period searching for information on *metals*, by the time we left the library he no information which would be useful for his homework but rather than being disappointed by this he simply said he would return tomorrow and try again. After three sessions on the Internet he had enough information to write very brief descriptions on six metals. On each occasion he would repeat the search he had carried out the day before, often going back to sites he had visited previously and identified as being of no use. He appeared to be unaware of any possibility of saving his search or marking relevant sites. At no time during the research on metals did Bill show any sign of frustration, he was prepared to sit as long as possible and to accept that any flaw was attributable to him. When asked how long he would usually spend searching the Internet he said; 'Ages probably, just keep going for as long as I was allowed to.'

Bill said he did not enjoy any of his schoolwork but if he had to make a choice he preferred to do project work, which required some research. He found set work, particularly in maths, uninteresting and 'boring' although he said that this type of work often took less time so that was 'a bonus'. Bill's academic marks reflect this dislike of 'set work', his marks were frequently low for homework that involved completing worksheets or answering textbook questions. He thought that he learned more from having to 'find things out' for himself because 'there's loads of information on stuff , you've got to do it yourself and you learn more.' One of the subject choices he made for GCSE was Business Studies because he thought there would be a lot of research, he was disappointed to find that it was heavily weighted in what he saw as 'set work'. He said there was nowhere on the course that encouraged research and he changed from Business Studies to Physical Education after the first term.

Bill had been shown how to use the Careers Library during his first term at the school but that was the only information skills training he could remember. It was confirmed that there had been no library instruction under the *old* system but that changed when the new librarian was in post and the new library was opened. However, the new programme was not in place by the time this fieldwork ended and Bill did not receive any information skills training. He did take part in the Internet Training Session that was offered to all pupils, attendance was

compulsory for anyone wishing to be given a password for the new network. During this session Bill appeared to be alert and interested in the beginning but he rapidly began to loose interest as the session focused on *conduct* on the Internet rather than actual *use* of the Internet. During this session Bill was sharing the PC with two other boys and he took the lead throughout, they did not request any assistance from the technician taking the class and completed all tasks correctly. Bill had himself relied on friends when the family PC was purchased, he did not know how to use any of the software but was shown by friends who already had home PCs.

Bill regarded the Internet as his primary source of information, he decided that since using the Internet Encarta was 'alright but it was a bit complicated. It's just loads of information, it should be less complicated for us to understand.' When the network was introduced Bill used the Internet every lunchtime and after school every night except Wednesday when he had football practice. He used the Internet to play free games and to locate game cheats, Bill claimed throughout the fieldwork that his primary use of the Internet was access to games, he also spent time playing the free games available on Encarta.

He later became very unhappy about the fact that it is a shared public facility and access time was severely cut. At the close of the fieldwork access was only permitted on two lunch times per week and a charge of £2 per hour was introduced after 4pm. Bill no longer used the Internet after school because he could not afford the charges. Bill did not have access to the Internet from home and so resumed his heavy dependency on Encarta for a great deal of his schoolwork. He suggested that the level of restrictions placed on Internet use had reduced the value of the medium to his work. He was also very dissatisfied with the level of instruction, he had never been shown how to use email, search engines, gateways or the browser facilities. The diary that Bill maintained during the fieldwork showed a bulk of entries during the first term, when the new network became available, many of the entries described long and complex searching that produced no useful information but Bill was ever hopeful. None of the entries criticised the Internet although many criticised Bill himself, he frequently referred to himself as 'stupid' for having selected the 'wrong' web sites from the list of hits he had returned. Although he had no idea how he could have made a more informed choice or how he could have limited his search.

Bill never made any attempt to verify any of the information he received from the Internet, when asked he said; 'well it's got to be true if it's on the computer doesn't it? It can't be lies can it?'. He thought this was true of all electronic information resources apart from *chat lines*, which he acknowledged as personal opinion, and up until this point had never been led to believe otherwise. By the end of the fieldwork Bill had become slightly more cynical about the information available through the Internet, but he still rarely bothered to check any details in additional sources.

Bill had access to some electronic information resources at home and at school, he never used any *outside* source such as the public library. His knowledge of the use of these resources was very limited although he did have a great deal of confidence in them and a high level of dependency on them. He never looked at any of the subjects or topics in any depth and always went for quick solutions rather than aiming for any in-depth understanding of the topic. Using electronic resources appeared to encourage this behaviour in him as he could usually locate sufficient detail by using the *keyword* facility on Encarta, he only looked at the text surrounding the shaded keyword and never examined the section in any more detail.

Bill was not a reader of printed material for pleasure or work at the beginning of the fieldwork and even after becoming a member of the library in order to access the Internet this did not change. He was eager to learn as much as he could about the Internet and related issues but did not have the resources to satisfy this need. On many occasions during observations Bill took the opportunity to ask questions as well as answer them and was always willing to take advise when it came from someone he assumed was an expert. This was not the way he regarded his female peers in this research project, he could become quite defensive if they attempted to make suggestions to him concerning his use of the resources.

CATH.

Cath was fourteen when the field work began and had moved into the area three months earlier to live with her mother, step-father, half sister and half brother. She lived within walking distance of the local library and her school on a new estate which had been built on the outskirts of the village. Cath had spent the past eleven years living with her father, step-mother and older brother in a different part of the country. She had made no close friends in the area when the fieldwork began and this did not change during the year that followed. Her

stepfather worked as a systems analysts and clearly had a high level of technological knowledge, there were three PCs in the home and one laptop computer, all of which were available to Cath. She used these computers on a regular basis, particularly to keep in touch with her older brother whom she e-mailed daily.

There appeared to be very little communication within the home, Cath developed a great deal of new skills during the fieldwork but there was no evidence to suggest that her parents were aware of this. She appeared to be having some difficulty integrating into her new environment and this may have contributed to some extent to the time she dedicated to mastering computing skills. She never left the house in the evening after school but she did go horse riding at weekends with her mother. Cath had made some friends in the chat rooms she visited on the Internet and she relied on them to share her worries, joys, and problems.

Cath had access to CD ROMs and the Internet from home for the entire duration of the fieldwork, she also used e-mail regularly. She had a PC in her bedroom which was exclusively hers and she shared access on the more powerful family computer in the downstairs study. There was also a laptop computer available at certain times which belonged to her stepfather, there were no restrictions placed on the use of any of the electronic resources available in the home. Although the stepfather had extensive knowledge of the resources there appeared to be no transfer of this knowledge within the home.

Cath was a member of the public library and used both the local and the central library at least once a week, however, there was no access to electronic information in either of these locations during the first half of the fieldwork. The level of access to these resources in school was somewhat of a disappointment to Cath before the school installed the new network but she did not feel this was of any real significance as she had access from home. She was frustrated by not having access in school at the point of need, prior to the new system she only had access to electronic resources during her one IT lesson a week. If she did not have a specific question at that time then she would 'mess around and waste the lesson' also wasting her once weekly opportunity to access the resources. This situation was frustrating for Cath but she had sufficient home access to compensate, she was more concerned about other students; 'what about those who don't have computers at home? there's plenty of kids who haven't got computers so what are they supposed to do?' Cath felt the school was letting those students down in particular.

Cath was also an avid reader and placed a great deal of significance of print-based material as a research resource. Once the new school library opened, Cath spent every school lunch break there using the computers or reading. Cath did not use electronic resources for 'the really important school stuff' as she believed that books were more reliable and were easier to use in terms of locating specific information. She did not have a high opinion of the Internet although she did use it she found it 'really hard to use'. She had a strong mistrust of information available on the Internet and was not confident in her ability to identify what she should be using. She also thought Encarta was particularly 'bad' as the language level was too complex and she often found that her interpretation of a subject rarely matched that of the resource. She thought it was 'silly trying to make out that Encarta was for kids because its not, its for adults who like really boring stuff and use big words'. Cath had received an A+ for every English assignment she had been given since starting this school and her use of language was well above average, yet she readily admitted that Encarta was too complex for her. The use of keywords to locate relevant information appeared to be the only search strategy Cath was aware of, she never attempted to use any advanced search techniques during the observations. She had attempted using other search options on Encarta but her lack of confidence in the resource made her particularly critical of the ability of the resource to address her own information needs. Cath always used more than one resource to locate information for homework assignments, she claimed never to have relied on electronic resources without supporting that information with additional evidence from a print based resource.

Cath preferred to work at home when using electronic resources, even after the new information network was available in the library. One reason she gave for this was that she did not enjoy being watched by staff while she worked. She felt inhibited by the restrictions placed on Internet use by the school, this was mainly due to not understanding what those restrictions were. She felt that 'if you do anything your not supposed to do they'll find out and you'll get into trouble, but they haven't really stressed what exactly it is you're not supposed to access'. Because of this she never felt comfortable using the resource in school and felt as if she was 'being watched all of the time.' Cath was a very conscientious student and she was always afraid that she might access something she should not and inadvertently get into trouble. She felt that she was able to learn more by working at home because her own computer was more 'welcoming' and she would experiment more without

the fear of damaging anything or getting into trouble. Cath believed that she learned more by being able to experiment for herself without being inhibited by rules and regulations she was unclear about.

Cath was in the top set for all of her GCSE subjects and took a great deal of pride in her work, sometimes she felt that teachers did not appreciate the amount of work she had done. She felt that in order to fully understand a subject or topic she had to read around that topic and try to develop a deeper understanding. She would often use 'cut and paste' facilities to take information from both Encarta and occasionally the Internet. She would then print out the page of notes and write them out in her own words, this was the only way she felt she could really take in what she was reading.

During the fieldwork Cath found a book which allowed her to teach herself advanced IT skills. Her level of IT literacy developed rapidly with the aid of this book and she began to do things that would have been well beyond her capabilities a year before. Because of this newly acquired skill Cath was producing assignments that went far beyond the briefs she had been given. She was particularly enthusiastic about one project in Graphic Design, she had to design the packaging for a product. Not only did she design the packaging but she also developed an animated advertisement for the product. After demonstrating this during an observation she made reference again to the book which had helped her to accomplish this piece of work. She was delighted with the book and pointed out regularly that she 'learned all of it from books in the first place'.

Cath felt that training in the use of electronic resources was essential if they were to be of any use and she did not feel that school placed sufficient emphasis on teaching these skills. She had been given one training session on the Internet but was distinctly unimpressed by the content of the session as it concentrated mainly on conduct and not on search strategies. Once again Cath pointed out that those who did not have home access were at a distinct disadvantage, 'we've been given access to all of this stuff but nobody has shown us what to do with it, like e-mail, I had to show some people in my class how to use it because they hadn't used it at home.' Cath had actually got into trouble on this occasion because of the library policy of one person to a machine, she had been caught demonstrating the e-mail facility to a number of students in her class. Because they were all sitting around the same machine they were told they could not have a lunch pass for the library for the remainder of that week. Cath did not volunteer to demonstrate or share her knowledge again after this incident.

Summary.
Cath appeared to be somewhat insecure at home at the time of this study, she had only recently moved to the area and was apparently having some difficulty in settling down and adjusting to her new life. This did not appear to be having a particularly negative impact on her education, she was an above average student who consistently achieved high grades. Cath was a confident user of electronic information resources who was able to discriminate at a high cognitive level, she also had a high level of physical access to those resources.

Cath was a highly motivated learner with sufficient confidence in her own ability to be able to identify when she has a need to develop further understanding or when a resource was not suited to her particular need. Electronic information resources did not appear to impress Cath simply because they are electronic, she judged the functionality of the resource regardless of format. The lack of provision of training in the use of electronic resources was a cause of great frustration for Cath, she taught herself to use these resources but felt that a lack of formal training could have significant implications for the efficiency and effectiveness of her methods of use.

DAVE.

Dave was thirteen when the fieldwork began, he lived in a small village three miles away from his school, he shared this with his mother, father and three brothers, two older and one younger. Dave had lived in the village all of his life and had a close circle of friends who have been together since primary school, he has increased his circle of friends since starting high school. Dave was a very active member of his local community, he frequently attended council meetings when the issues being discussed were of particular concern to him, and these tend to be related to activities for young people in the area. During this research he was actively involved in a local campaign to provide a playing field in the village that was safe and well maintained. He had already petitioned the local council but this had not resulted in any positive action, he was quite sure that he could think of something else and had no intention to give up. Prior to this he had taken a very active role in a recent campaign, which had successfully stopped an attempt to introduce an open-cast mining scheme in the area. The success of this campaign had increased his motivation be remain active, he was confident in his ability to

'make a difference' by getting involved. He was very interested in politics and had very clearly defined ideas concerning individual rights. His family was very supportive of him although they rarely got involved in any of his campaigns, they would often help him to organise his activities. He was also a member of the local amateur dramatic society and enjoyed acting, a hobby that was encouraged from home. Dave comes from a very secure and supportive family background, he was aware that his family often found his pro-active behaviour somewhat bemusing, it was not something they were familiar with.

Dave wanted to work for the RSPCA when he finished his education, he loved working with animals but had decided he was *'not clever enough'* to become a veterinary surgeon. He had very little confidence in his academic ability, although he was very confident socially.

Dave had no access to a computer from home, his parents could not afford to purchase a computer and as Dave pointed out, even if they could, *'who would pay the phone bills for using the Internet?.'* Neither of his parents were IT literate, they had no experience of using new technologies at all. Both parents were in full time employment, his father was a labourer and his mother a care worker. His mother had expressed a desire to take an evening class in Information Technology, but she did not have the time. One of Dave's older brothers had been involved in a pilot scheme at school looking at the possibilities of a school Intranet and as part of this he had had access to the Internet from school. At the beginning of the fieldwork, prior to the new information system being introduced, Dave had high expectations of the possibilities of the Internet. Much of this had come from his older brother who would tell him what they had been doing as part of the pilot scheme.

During the first part of the fieldwork Dave had no access to electronic information in the Public Library and although the school library was officially closed, he was allowed to use the one computer in there to access CD ROMs. He used Encarta to help with his homework, a project he had done on South Africa had involved a great deal of independent research and he constantly referred back to this during discussions. He was very confident with the information he retrieved from Encarta but had no understanding of how the resource worked. This was a privilege and Dave assumed this was because he had asked permission very early in his first year at the school to carry out some research on that machine. From then on he was allowed in the library at lunchtime to use the resource. This was the only access Dave had to any electronic information resource until the new library was opened.

After the opening of the new library Dave spent a considerable amount of time in there accessing the Internet. He enjoyed using the Internet and had been shown by a friend how to access his email, he started emailing the researcher on a regular basis for two months. A charging policy was introduced by the school and this had considerable impact on the way Dave used the Internet. He spent very little time in the library and his email activity declined considerably as he could not afford to pay. He had tried to maintain his level of access by using money he earned from a paper round, but eventually he gave up as it was taking all of his earnings and he regarded this as somewhat extravagant. He had other hobbies and he had been responsible for paying for these from his earnings, he decided that Internet access was not a priority. The school still allowed free access at lunchtime, although it was very difficult to book any time he saw this as his only option. Dave had not used Encarta in school since the new library opened because he said he did not know if it was still available and if it was then he did not know how to access it. He said the Internet had taken over everything but he could not pay for it so he was left with very little except the books in the library. After the initial excitement of the new system, Dave was left feeling very disappointed, he felt that a lot of promises had been made but he was not amongst those could benefit from those promises. He felt very excluded and although having home access had not been a priority for him early in the fieldwork, he was beginning to think that having access at home would make the difference between doing well at school and falling behind. He had started to put pressure on his parents to buy a computer by the end of the fieldwork. He told the researcher that he felt quite guilty about this because he did not think his parents could afford to make such a large purchase but he did not know what else to do.

Dave did not regard himself as a high academic achiever, he worked hard at school and did take his work very seriously but he had already decided before he moved up to high school that he had very limited academic ability. There was no evidence of this from the work seen by the researcher and he demonstrated high levels of enthusiasm for the research projects he discussed in interviews and observations. Dave claimed to prefer set work which did not involve any independent research, he thought this was easier because it was clear what was required and how much work was necessary. However is proudest moments appeared to come from two particular assignments; a project on South Africa and the production of an issue of the school newspaper, both

of which involved large amounts of independent research. He found both of these pieces of work difficult, yet he used them as examples frequently and was more than happy to allow the researcher to read both.

Dave had very little understanding of how to search for information using Encarta and the Internet, he spent a great deal of time on 'trail and error' behaviour which made him feel particularly inadequate. His first experience of using Encarta had been in school whilst working on the newspaper. The school technician had been asked to run a session with the group and help them to retrieve information for the project. The technician had asked what they were looking for and he had performed the search on their behalf. Dave had no idea of the steps the process involved. He had sat and watched as the search was performed and he could only remember vague details. He had returned later to conduct the search on his own and he failed to find any of the information that had been located.

In contrast to this Dave carried out a search for his mother on the Internet during the first term after access became available, this search was highly successful and increased Dave's confidence in his ability. He had promised to get some information for his mother on her favourite actor. Because the subject was a popular one and because there was little restriction on the type of information needed Dave was very relaxed about the search. He retrieved a vast quantity of information after a very basic name search and paid to print out some of what he had found. He also experimented for quite some time on the difference between the official web site he found and other sites about the same person. He discussed the difference between the credibility of the information in each location and eventually made his mind up the both official and unofficial would be useful. The reason he gave for this was that both would have their own perspective and both would be valid for a variety of reasons. He decided that all his mother would want would be some official information this time but he would let her know that other sources were available. Although this was a very basic search and could be regarded as slightly trivial, Dave leant a lot from this experience that could be transferred to other searches whatever the topic. The school banned this type of search after the first term and students were told that if they wished to search for information in relation to personal hobbies it would have to be done outside of the time when free school access was available.

Dave had only one training session on using the Internet after the new system was installed, this was again taken by the school technician and concentrated mainly on giving details as to what was allowed and what was not in terms of access. Dave was shown how to log on to the system using his password and then allowed to see what sort of information was available. This was all done in a very brief section at the end of the session and although the students were told they had access to email, they were not given any instruction on how to use it. Dave discovered how to use his email account from a friend after school in the library, his understanding was very basic and he needed his friend present to open, read, author and send messages for a number of weeks. He was enthusiastic and as the researcher was his only external email contact, there was considerable communication during this learning period. Dave relied heavily on his friends to provide instruction and guidance on the use of electronic information resources. He also used his perceived lack of ability to confirm with the researcher that he was a low academic achiever.

Summary.
Dave had a very secure and supportive family, they did not have the financial means to provide access to electronic information resources from home but did encourage Dave to learn as much as he could from school. Dave was a very pro-active citizen, he was involved with local politics and had a very clear sense of his role in the community. Before the new system was introduced in school Dave had very high expectations of the Internet and electronic resources in general. He did not have access to any of these resources outside of school and looked on the new systems as his opportunity to experience and become familiar with the new technologies he was constantly hearing about from friends, family and the media. When he did get access to these resources his initial response was one of enthusiasm and pleasure, he was sure that it would be of great benefit to him academically. This enthusiasm was short lived, he became frustrated by his lack of ability and dependence on friends. He was also aware that not having home access was a clear disadvantage and he could not see any possible change in this situation in the near future.

Appendix 6:
Participant Profiles from Site B

EDDIE.

Eddie lived in a large house in the centre of the city, he shared his home with his mother and father and one younger sister. Both parents were in full time employment and both had a degree. His parents placed a great deal of importance on academic achievement and provided Eddie with as much guidance as he needed. Eddie had lived in the same area all of his life and had a small circle of close friends, all of whom were very interested in new technologies. He was a keen sportsman, he was on the school football team, rugby team and swimming team. Eddies was a very private person and did not like to talk too much about anything he did not see as significant to the research. He did not give any details of his personal life without being specifically asked about them and even then the information was limited.

At home Eddie divided his time between sports and computer activity, although he did say that it was more important to increase his knowledge of new technologies. He had no particular interests other than football and new technologies outside of school. Although he was a high achiever in school, he preferred to keep a very low profile, initially he was rather reluctant to let any of his friends know that he was taking part in this research. This changed as the fieldwork progressed and he became more interested in the subject of study. Eddie asked more questions about the progress of the research than any other participant and maintained regular contact with the researcher using email throughout the study. Contacted ended as soon as the researcher exited the field.

Eddie had access to the Internet, CD ROMs and other software from home. There was one family computer available in the home and his father had an additional machine from which Eddie could access the Internet if another family member was using the shared machine. His parents encouraged both Eddie and his younger sister to make use of all the electronic resources available, although they did outline strict guidelines, Eddie was allowed to access the Internet for a maximum of one hour each day. He knew that he could only use certain sites and although there was nothing definite about what he could not access, he appeared to have a very clear understanding of what would be allowed and what would not. His father had spent considerable time explaining the Internet and how it worked, he also gave clear guidelines as to how the information should be used. Both children were encouraged to use the Britannica CD ROM for a lot of factual information seeking in relation to schoolwork.

At school Eddie had no access to the Internet, he thought this was wrong but said that if they did have access it should only be through a school Intranet which could be controlled centrally otherwise people would *'do really stupid things and get the school into trouble.'* School did provide access to CD ROMs and a school database but this was limited, it was only available with special permission for specific projects. As a result of this Eddie relied heavily on home access. Although his Public Library Authority did provide access to electronic resources these were only available at the central library and Eddie only used the local branch. He was a regular user of the local branch library but this was mainly for recreational reading material. He had a very clear understanding of the benefits and shortcomings of electronic information. He understood the need to clarify information from more than one source and was reluctant to place too much trust in information found on the Internet unless he was able to verify the source.

Eddie had his own web site which he worked on with his friends, they each had their own site and they worked together to try out new ideas. They had each created a discussion group within their own web sites and they used this to communicate with each other and discuss their ideas about designing the pages. The researcher was invited to join the discussion group and the other members would frequently enquire about the research and make contributions concerning their own thoughts and ideas.

Eddie was a very high academic achiever, he was in the top set for all subjects but he did not enjoy school, he saw it as a means to an end. He wanted to work in information technology and was aware that competition was high, he wanted to do really well now in order to increase his chances of following the career of his choice. Eddie had received information skills training at school and frequently received help from his father. He preferred to learn by doing. He was aware that it was possible to use electronic resources to carry out surface learning, in terms of fact gathering, but was also aware that he did not always learn this way. He was prepared

to take whichever approach to learning suited the purpose. Usually this purpose was to attain the highest marks possible but in areas of particular interest to him, usually Information Technology, he would often carry out extensive research that went well beyond the remit of the assignment. Eddie was very conscious of *'remembering things for tests, because that's where it counts.'* Eddie usually took a very pragmatic approach to searching for information, he did use the Internet a lot but pointed out that he usually used links from his Encarta or Britannica CD ROMs to be sure that the site would be useful.
Eddie was a highly skilled user of new technologies, he was confident about his ability to apply the technology. He enjoyed organising information and planning that organisation. During this research Eddie had asked to change the design of the Log he was keeping concerning his use of electronic information. He used the original Log as a template and designed his own database in '*Access'* fitting the same fields. He said it was easier for him to use, he also said that he had enjoyed creating the database, he said he learnt a lot from doing it. He also identified his project searches by adding a field to the database that made those entries unique. He had thought about the purpose of the Log and tried to identify how it could be improved. Eddie is frequently asked for help from his school friends and his happy to provide this help whenever he can. He said it was very satisfying to be able to help people, it also made him feel more confident about his ability.

Summary.
Eddie was a very private and serious person, he came from a very supportive family background that provided a very high standard of school related resources for use by the two children in the family. Both parents were highly IT literate and able to provide instruction and guidance on the use of electronic information resources. Eddie had access to wide variety of information resources and had the skills necessary to use those resources efficiently and effectively. His parents had high expectations of him but they were also prepared to help in any way they could, they showed an active interest in both his schoolwork and his hobbies.

Eddie had extensive access to electronic information resources and was highly competent in using them. He had a deep understanding of the nature of information and could distinguish between 'opinion' and 'fact'.
He took a very pragmatic approach to learning, he had very firm goals and would arrange his learning in order to attain those goals. He was a very content and confident person who worked hard to reach his goals but he did not allow this to dominate his life.

FRED

Fred lives in a small terraced house in the centre of the city, he shares his home with his father and his two brothers, one older, one younger, at the beginning of this fieldwork Fred was thirteen, two weeks away from his fourteenth birthday. Although he has lived in the city all of his life, he originally lived in another part of the city and went to school with a completely different group of people. When he started to attend this school he had no friends here and had to start making new friends and mixing with an entirely new circle. Although he did try to retain contact with his friends from his previous school he found this impossible and had not seen or heard from any of them in over a year. Although Fred did appear to be confident and happy at this school he constantly talked about his old group of friends and often commented on how much he missed them. His older brother was in the sixth form at the same school and his younger brother attended a school two miles away. This was a problem for his father, he worked full time and had to collect the youngest child from a childminder then come and collect Fred from school. Because of this Fred stayed back in school every evening until 6pm. He stayed in the school library and he said this was great because it meant that by the time he went home his homework was usually done and he did not have think about it anymore.

Fred does receive support and encouragement from home but his father has no knowledge of new technologies and is not able to offer Fred any guidance on how to use these resources. Fred does not see this as a problem, he said it was good to know more than his Dad did and if his Dad had time he would have liked to teach him about the Internet. Fred spends most Saturdays in the Public Library using the Internet, he lives very close to the central library and is able to walk there from home. He knows the library very well and enjoys being there, he frequently uses the special collections and talked with relish about the white gloves that have to be worn to examine some of the material in these collections. He usually spends Sundays playing football with his friends in the street but he said he did not always enjoy this as he was not particularly good at football.

Fred had no access to electronic resources at home but did not see this as a disadvantage as he lived so close to the Public Library and he had access to all he needed from there. He preferred to use the Internet in the library because he said having someone on hand to help was a real advantage. At the Public Library Fred had access to the Internet, email, CD ROMs and the library databases.

At school Fred had access to CD ROMs which he often used after school whilst doing his homework and waiting for his father. He also used the school databases and the library catalogue. Fred did think that Internet access from school would help him as he had to wait until the weekend and often he was given homework, which had to be submitted during the same week. He felt that when this happened he missed out by not being able to do some of the research using Internet sites. He appeared to regard the Internet as his most superior information resource and frequently mentioned how easy it was too use. This was contradicted by events witnessed during observations, when Fred frequently had many problems locating relevant information through the Internet. He would often spend a great deal of time searching without any apparent success, when this happened he would always take responsibility for search failure. He never questioned the Internet, did not try to find any excuses or legitimate reason other than his own lack of knowledge.

Fred frequently used CD ROMs during school lunchtime and after school. He claimed to enjoy this but not as much as using the Internet. In his role as Library Monitor, Fred had acquired good information and library skills, which he was happy to share with the other students whenever they asked. This duty often took up the entire lunchtime and Fred was more than willing to spend as much time as possible in the school library. He was very familiar with the school library catalogue, since it had been automated many of the students had problems using it and Fred enjoyed being in a position to help out whenever he could.

Fred was in Set 2 for all of his GCSE subjects, he was a very conscientious worker and he said that he had to be. He claimed not to be very '*bright'* and because of this he had to work really hard to stay in Set 2. He wanted to do well at school and he was prepared to do whatever was necessary to succeed. Staying behind after school had originally been a means of dealing with the problem of childcare his father had experienced when Fred started this school. Fred now regarded it as a distinct advantage, he had to be there so he used the time as well as he could and made sure all of his homework was completed during that period in the school library.

Although Fred had good library skills, he often found it difficult to locate relevant information using the Internet, his claim that the Internet was easy contributed to the lack of consideration he gave to his searching techniques. He had assumed that all he had to do was type in a word and this would bring up the answer, if this did not happen then the information was not there. If he knew the information was there and it still did not appear in the results of his search then he blamed himself for not looking for the right thing. He did not appear to be aware of the limitations of the search engines he was using or of any means of compensating for these limitations. Fred preferred to work in groups because he felt more confident if he was able to share his findings and receive confirmation that there was agreement within the group.
Fred had never received any formal training on Internet searching, he used instinct, this was in stark contrast to his searching behaviour when using the library catalogue, he understood how to search for information but he did not appear to be able to transfer this to any other electronic resource.

Summary.
Fred was an enthusiastic student who worked hard in order to maintain his relatively high standard of work. Although he did receive support and encouragement from home, his father encouraged him to do well but was unable to offer any guidance in relation to electronic information use. Fred had managed to fit in well in his new school and to make a new set of friends, he appeared to enjoy school and was able to make good use of his time there.
Fred had a great deal of confidence in his ability to use electronic resources but the observable evidence did not always support this but the researcher had noted that he was shy and this could have made him very nervous in the early stages of the research. His lack of understanding relating to Internet searching did not appear to improve as the research progressed although he had, by this time, opened up to the researcher.
There was evidence to suggest that Fred was only confident on the surface. He often relied heavily on others to confirm and support his findings and was never particularly confident and self-reliant. He preferred to work in groups when carry out independent research because he felt he needed the support of others. He would always confirm his findings with other students even the work had been set as an individual task. If his results differed in any way from those of his friends, he would always suggest that he was wrong. Fred had very little confidence in his own ability when it actually came to making his work public.

GWEN.

Gwen was thirteen when the fieldwork began, she lived with her mother and one brother in a flat in the centre of the city. Gwen spent a great deal of time at the home of her maternal grandparents, both after school and at weekends. Her mother was training to be a nurse and worked long, unsociable hours. The grandparents were

responsible for the childcare for both Gwen and her younger brother. She has no contact with her biological father and she has no memory of him at all. Both of her grandparents are IT literate, there are two computers in the grandparents home and Gwen frequently uses the Internet but only for access to chat lines. At the beginning of this research she had never used the Internet for any school-related information. Her mother was also taking a course in 'IT', as she was aware that she would need to have these skills in order to help her with her training.

Gwen was very aware of the difficulties her mother was having in relation to studying, working and bringing up a family. She said she would never be in that position, she also wanted to be a nurse but was adamant that she would be qualified before she even considered having a family. Gwen had many friends at her school, friends she has known all of her life and she spent much of her free time with these friends. They spent a large part of their weekend at the shopping centre, she never had any money to spend but said that that was no reason not to look. Gwen enjoyed school but made a point of saying that this was because of the social aspect, *'not the work side of it.'* She was a very keen sportswoman and enjoyed being on the school netball team, she also enjoyed running and swimming. She informed the researcher at the first meeting that she was in the bottom set for every subject and wanted to know why she could be of any use to the research.

Gwen did not have access to any electronic resources from her family home but she did have access at the home of her grandparents and she spent the majority of her time there. She claimed to use the Internet every night after school but her use was strictly for access to chat lines. She did not use the Internet as an information resource for schoolwork or any other information other than chat lines. She said that she always used the books the teachers told her to use because she was very unsure about what else she should be looking at. If teachers did not recommend a particular text, Gwen would always ask where she should go to find the information she would need to do the homework.

She relied on the school library for all of her information needs, she would not work in the library but always took books from there unless they had been given a text by the teacher. She said that she did not feel able to select books that had not been recommended because she was frightened that she may choose the wrong one and get her homework wrong. This was also a factor in Internet use, she was very unsure about what was available and she was not prepared to take any risk in case the information she found was wrong. She displayed a lack of confidence in using the Internet yet when she access the chat lines she appeared very confident and had no difficulty in locating the site she wanted and in taking part in the discussion. She had attempted to use the school library catalogue on one occasion but she had not be able to understand how it worked and had given up. She did not think to ask the librarian for any help, she said she would not have anyway as she thought she was supposed to know how to use it and she might have been in trouble if she had asked for help. Gwen never used the Public Library, although she lived very close to the central library, she said that she was unsure about what to use so she only used schoolbooks. Gwen did use the CD ROMs at school, she liked Encarta, when one of her friends had shown her how to use it she had been very pleased with the results. Although she had managed to conduct a very successful search during an observation, she was very dependent on her friend and claimed that she would not try to use the CD-ROM without her friend being there.

By the end o the fieldwork Gwen had used the Internet to try and find some information for school, she had found lots of information relating to the subject and was very pleased with the results. She had used some of the information in the final piece she handed in and was very relieved to discover that she had made the correct decision about what to include.

The fact that Gwen was in the bottom set for every subject was not an indication of how hard she worked, she did not like the academic side of school but she worked very hard in all of her subjects. This was confirmed by comments made by her teachers on a number of occasions. Gwen usually took the '*safe'* option and never produced work that was in any way 'original' but she usually satisfied the criteria for the homework assignments and always handed work in on time.

Gwen relied very heavily on her friends to support her in her work. She regularly asked friends to read over her homework and tell her what they thought of it and she always preferred to work in groups. She claimed that she learnt more from working in groups but also said that she felt more confident if she had produced a piece of work in collaboration with others.

Working with her friends often provided new opportunities for Gwen, she learnt how to use Encarta by working with a friend. On the first occasion the friend had carried out the search and Gwen had looked on,

although she said she tried to remember what her friend had done, she could not. She knew no more about searching the CD-ROM than she had before the search. The result was very different when they carried out a search at a later date, this time her friend had told her to conduct the search. Gwen was given instructions and she followed these to the letter, she asked questions throughout and when the search was complete she appeared to have a much clearer picture of the process. This did not increase her confidence sufficiently to encourage her to conduct a search on her own, during a subsequent observation Gwen wanted to look for information on 'The Industrial Revolution', she asked her friend to sit with her again and they looked for information together. Gwen said she would never feel confident enough to do this on her own because she was not sure if she had understood everything and she was frightened in case things went wrong and there was nobody there to help her to sort things out. Gwen said that she had been given formal instructions on how to use the library during her first year at the school, it was a compulsory activity and they were given a mark for as part of their English term assignment. She said that if she had been given the same type of instruction on using CD-ROMs then she was sure she would be more confident about using them.

Summary.
Gwen enjoyed school very much, she was not a high achiever but this did not taint her opinion of school. She enjoyed being with her friends and she enjoyed being part of the school. Her commitment to the school was evident in the way she contributed wherever she could, she worked hard to stay on the various sporting teams and volunteered for extra curricula activities. She had a very active social life and placed great emphasis on having close friends around her. Her confidence in herself was very tentative, it was easily shaken and rather than have this Gwen would often avoid anything that involved taking a risk. She rarely tried anything new, and even when she did it was only with the support of a friend. She was very conscious of 'getting it wrong' and was not prepared to trust her own judgement.

HELEN.

Helen lived in a large semi-detached house a few hundred yards away from her school. She lived with her parents and one older sister, both parents were in full time employment and her sister was in year 11, about to take her GSCE exams. Helen did not like or dislike school, she said it was just something she had to do and she had never thought about it. She did say that she could think of better ways of spending her time but they really were not very sensible and would not do her much good in the future. Helen liked to spend time playing outdoor games, she was a keen cyclist and enjoyed going out with her friends cycling around the area. She had no idea what she wanted to do when she left school and said that she had not thought about it seriously as yet.

Her hobby was cycling and the majority of her time during the week was taken up by homework. She stayed behind almost every evening after school with her friends, they tried to complete all of their homework at school. She said this was the best way to make sure it got done because if she went home she was always distracted. Usually she would go out with her friends but during the winter nights her parents were very strict about her being out of doors so she would play on her computer. Helens' parents were not IT literate and did not understand anything about new technologies, Helen claimed that they would avoid any contact with technology whenever possible. They had bought a computer as a shared Christmas present for Helen and her sister, it had been their uncle who had set up the machine and during the Christmas holidays he had spent time showing the girls how to use it. The parents had refused to be involved and would not attempt to try it out. Helen said that if her uncle had not lived so close by then they would have been in trouble a number of times. She or her sister often asked the uncle for help and he would come round and sort out any problems they had. Helen and her sister had a very good relationship and often spent time together, cycling was a family activity as well as something she did with friends. Helen was a very enthusiastic and energetic participant in the research, she frequently contacted the researcher with additional information she thought would be of some use and was very confident when answering questions. Helen had lived in the same house all of her life and had the same

circle of friends since starting primary school, she was an 'average' student, although she was in the top set for English, which was her favourite subject.

Helen had access to CD ROMs and the Internet from her home computer, the computer was in her sisters bedroom although it did belong to both of them. She sometimes used Encarta for school-related research but never used the Internet for that purpose. Use of the Internet was exclusively used for recreational purposes and other than limiting the length of time it was used there were no restrictions placed on how it was used. Helen claimed that the reason for this was that her parents had no idea what it could be used for so they could not define any limits. The sister often used the Internet for schoolwork but Helen did not know what she used or why and was not interested in finding out. Both Helen and her sister used the home computer for games, they frequently played the games that had come pre-loaded when the computer was purchased.
Helen used CD ROMs at school and at home, Encarta was her most reliable resource, she always used that for school and preferred it to using books. She could not read from the screen so she frequently printed out large amounts of text and then made notes by hand from the printout.
Helen did not use the Public Library very often, she only used the it if she was *'stuck, if there's nothing at all anywhere else'.* Her local branch did not provide access to any electronic resources so Helen would go to the central library, but only when there was nothing to be found anywhere else. She had been given formal training in how to locate information in the library and she was confident in her ability to find what she needed.

Although Helen stayed behind after school most nights, she still claimed to enjoy working at home more because it was more relaxed. She said that it was always better to finish a piece of work without having to take it home but it was definitely more comfortable to work in private at home. Helen had not received any formal training on the Internet or CD ROMs, she had learnt by asking and by 'trail and error.' She often stayed behind after school and would always ask a member of staff for help if anything went wrong or if she was experiencing difficulties using the software. This was how she found out how to use the library catalogue at school, she tried to find something and when she failed to locate the item she was given instructions from a library monitor.

Helen was often asked to help friends, particularly those who did not have home access and had very little experience of the technology. She was very proud of the fact that she was asked to provide help in this way. She enjoyed passing on her knowledge to her peers and when she was observed doing this she demonstrated considerable skill. She was able to pass on her knowledge to her peers without making them feel foolish and she was prepared to go over the same instructions a number of times if it was obvious that they had not understood. Helen thought that she learnt a lot from this because when she was talking to them she often realised that there were many things she was not sure about so she would then attempt to discover more than she been aware of. One example of this occurred when she was asked about using the 'Timeline' facility on Encarta, Helen had used this before and knew what to do to access it, but her friend wanted to know how to export a picture from there into her own document. Helen did not know, as her friend had no experience of the software she was not prepared to try, Helen on the other hand was. After a number of unsuccessful attempts Helen eventually discovered how to place the picture into a 'Word' document, she then went through the whole process again to show her friend. Both left that session knowing more than they had at the beginning, both teacher and learner became learners.

Summary.
Helen had a very secure home background, she was a confident and happy young woman who did not have any strong feelings about her education or learning in general. She had access to electronic resources at home and at school but did not appear to place any great significance on to this, it was just there, like the television or the CD player. She did not have any preconceived expectations concerning electronic information, she did not think about in any detail at all. The home computer had been a Christmas present for both Helen and her sister although it had not occurred to Helen that it could make significant impact on her schoolwork.

She enjoyed being able to make use of electronic information and she was aware that not everyone had the same privilege. Although Helen did not have any real career plans at this stage and she often appeared to be disinterested in school, she was very keen to do well. She did take her schoolwork seriously and she wanted to do well. She was very unsure about the contribution electronic information could make to this and was rather disinterested.

Appendix 7:
Participant Profiles from Site C

IAN

Ian lived with his parents and his younger brother in a semi-detached house very close to his school. His father worked as a Librarian in the public sector and his mother was at home full time. He moved to this location whilst still attending primary school so he had been with the same friends throughout Middle school and on into High school. Ian had a number of hobbies, he was very keen on building robots when this research began and was attempting to build a robot that would earn himself and his friends a place on the television show 'Robot Wars'. He did not have a great deal of success with this venture, as they could not find a motor that was affordable yet in good working order. They had spent many hours collecting parts but when it came to the crucial element they found it very difficult. The plan was dropped before the fieldwork ended although Ian was still very keen to try again at some point.

This hobby gave way to computers, the Internet, reptiles, and watching television. Ian came from a very close family, which included grandparents, aunts, uncles and cousins. Although they do not all live in the area they did keep in very close contact and visited each other on a regular basis. Ian had no particular feelings about school, other than he would rather be somewhere else most of the time. He said his school was no better or worse than any other as far as he could tell. Ian had wanted a computer of his own for a considerable length of time but he did not own one by the time the fieldwork for this research had ended.
Ian was very enthusiastic about taking part in the research and he showed considerable confidence when he offered to help with organising times and dates for interviews and observations. When we made arrangements for the observations, Ian was perfectly comfortable to take charge of the time and the place, he was very positive and pro-active.

Ian had no access to electronic information resources at home, he had been asking for a computer for a long time but his parents did not see it as a priority as he had access from other locations. Ian was not in agreement with this and said he felt considerably disadvantaged by having to do all of his work at school or in the public library.

Access to electronic information resources in school did change during the fieldwork; to begin with access was available throughout the school day and up until 5pm in the evening. The times did not change during the fieldwork but new restrictions were placed on the sites were accessible. The new filtering system caused many problems for Ian, he was unaware of the restrictions and did not know what he was allowed to use and what he was not. The new system was also less robust, Ian mentioned that the system crashed all of the time and this made him very angry. He described an occasion when he had an assignment to hand in and the system crashed, he had to take is work to a stand alone machine and print it out there. This made him late for a class, although he did admit that he had left the assignment until the last minute. Ian has never been given any formal instruction at school on using electronic resources, everything he knew had come from friends. He started using the local public library much more to access electronic information during this part of the fieldwork, although access was limited there he found the system more reliable and liked to work in that environment. Ian had always been a regular public library user and was very familiar with locating information in that environment.

Ian preferred to access electronic information resources from school, he enjoyed communicating with his friends using email and he had only discovered how to do this when a friend had shown him at school. He had started to email a friend in Australia who he had met through one of the discussion groups on one of the role-playing game sites he used often. He often discussed schoolwork with this friend as well as robot building and web page authoring. This relationship had begun to fade after Ian stopped using email at school, he could not afford to pay for access in the public library and the system at school had become too unreliable.

Ian was very keen on building machines, his favourite subject at school was technology and he found research into inventions particularly interesting. It was during an assignment on alarm systems that Ian made many of his discoveries about what was available through the Internet. He was able to apply the knowledge he already had of the subject to the information he was retrieving from Internet sites and he could then make informed decisions about the reliability of the site. Ian was able to transfer this knowledge to searches that he knew less about. He became aware that it was important to check the details from more than one location. Although Ian

was a skilled library user he did not always apply these skills to the electronic environment, he would often spend a considerable amount of time '*rummaging around for something that might be interesting.'* He was conscious that this was not the best way to approach any search for information, but lack of understanding and sometimes lack of real interest in the subject would lead to aimless '*rummaging'* that sometimes lasted for hours.

Ian did not like school very much at all, he said there was nothing about school he enjoyed and he often failed to see the point in what he was doing. He was a relatively high achiever but he saw this as a necessity, he wanted a good job so working hard at school was just something he had to do. Ian was very keen to learn all he could about the resources available to him and he frequently approached his friends to help him out. This was most evident during his web page design, he had decided to create a web page with a 'Star Wars' theme and he was having trouble downloading graphics from the Internet. A friend showed him how to do this and after that he applied this knowledge to his school projects. Ian still uses printed material and is aware that electronic information is not always the best information but he admits that he prefers to use it because it is more exciting.

Summary.
Ian had access to electronic information resources at school and in his public library. His knowledge of the use of electronic resources was limited and he was aware of this, always eager to seek guidance from his friends. Ian did not like to spend a great deal of time on school projects or homework, he would always do 'just enough' to complete the required task and no more. Using electronic resources encouraged him to investigate further on many occasions but this was only when the research was concerned with one of his hobbies. Ian was a regular public library user with good library skills, he never used printed material from the school library because he said it was too badly organised to find anything there at all. Ian was very keen to understand new technologies and was well aware that he still had much to learn. He was very willing to experiment and frequently sought help from his friends.

JOHN.

John lived with his parent and his two older sisters, one was still at school the other was a nurse at the local hospital. John had two hobbies; new technologies and judo. Both of which he worked hard at and dedicated a lot of time too. He was a member of a Judo club owned and run by his father, he had designed a web site for the club as a gift to his father. John had originally attended another high school in the area but asked to move to this site at the beginning of year 9. He left all of his friends from junior school but had made many new friends and still kept in touch with his other friends who all lived close to him.

During the research John designed and built his own computer from parts he purchased by mail order, he was very proud of this achievement and provided the plans and specifications for the researcher.
John enjoyed school and had taken a number of courses at the local technical college, which his father had financed. John was very enthusiastic about his school at the beginning of the fieldwork but this changed with the introduction of the new system.

John had access to CD ROMs, the Internet, the school Intranet, email and the school databases from home. He had been selected to pilot a scheme and the school had provided a modem and Internet access, although his parents were responsible for all charges other than those between school and home. John would prepare his homework assignments at home and send them to his workspace on the school intranet, there were plans to provide this facility to all students but little progress had been made by the time the fieldwork came to a close. John had unlimited access from home, his parents were prepared to trust him and John was very conscious of the need to honour this trust.

At school John had access to all of the resources he used from home, he spent every lunchtime and every evening in the pyramid working on the computer. Sometimes this work was school-related but very often it was to work on his own web site or the web site for the judo club. He preferred to use the Internet although he was aware of which CD ROMs were available and how to access them. Before the new system was introduced John

was asked by the Head teacher to help with an evaluation of possible filtering software, John found this rather amusing as he claimed there was no filtering software available that could be guaranteed to be absolutely secure. He did try three filters and succeeded in getting out from all of them although he refused to explain how he had done this. He did say that it would probably not be that easy for the majority of students and he admitted that he had tried very hard to 'get out', but that was the request the Head had made. After the new system was introduced John spent very little time using electronic resources at school and concentrated on home access. He found the system too restrictive and although he may well have been able to bypass the system he did not feel comfortable using school resources. John never used the public library, he did not want to pay for access to the Internet and he did not feel he needed access to another resources that he could not find at school or at home. John had received library skills training from the public library and was a very competent library user. He claimed never to use books at all but this changed later in the fieldwork. Once he had stopped using the school library he began to make heavy use of the reference section at the central library.

John preferred to access electronic information resources from home, he did enjoy working at school during the first part of the fieldwork but said that he felt 'more relaxed' at home. John enjoyed working on assignments for Electronics and Technology, he would spent a lot of time researching the topic and would often do far more than was necessary to fill the requirements of the assignment. He had a personal interest in both of these subjects and his career ambitions acted as an additional driver. During the fieldwork John had mentioned that he would like to work at for a large German company which had recently established itself in the area. Before the fieldwork was complete the company had closed down its operation in the area. This made John think about the choices he had made and he decided that he may have been making a mistake by limiting himself this early on in his career. He had decided to study electronics to A level and go on to university, he had not made any definite plans but he was interested in aerospace technology.
From the age of 9 John had attended the local technical college, he had enrolled on an Information Technology course at the Saturday Junior College. His father, who was very keen to see John develop his technical knowledge, financed this course. After completing the Junior route John's tutor suggested that he enrol on the advanced adult course, to do this he had to obtain special permission from the Principle of the college and from his Head teacher, both willingly gave their consent and John's father agreed to pay for the course.

The Head Teacher at John's school asked him if he would like to run evening classes for some of the teachers at the school to pass on his knowledge, John agreed to do this and was very proud, he contacted the researcher and arrangements were made to observe these sessions after they had become established. John spent a lot of time developing teaching materials and made some very interesting discoveries in the process. By the time the first class was due to start John had added to his already substantial knowledge of the Internet and electronic resources in general. Unfortunately none of the teachers turned up for the first session and John wasted a lot of time waiting for them. This happened on three occasions, John 'had no idea why nobody turned up.' Eventually the course was cancelled and John was never given the opportunity to pass on his knowledge and experience to teachers.

He spent much of his time in the library sharing his experience with his peers, who were very keen to make very good use of his skills. John was rarely able to make it through a single lunchtime without being asked for help by somebody, he did not mind this at all. He said he would rather show people how to do things because if he just did it for them they would never learn and they would always be asking him. If he spent more time and actually taught them how to do things then they were not likely to need to be shown again.
John changed his attitude towards electronic information towards the end of the fieldwork, he said it was due to the new system, he still enjoyed using the Internet and claimed it was his most reliable source of information but he had started to use printed material much more. He used printed material for quick reference work because he said it was not worth the time and effort getting on to the system for small amounts of information.

Summary.
John was driven by a personal interest in new technologies, he was encouraged by his parents to pursue this interest, and John had a very close family and a secure home background. He had access to a vast assortment of electronic information resources but he had worked very hard to build this collection, both financially and as a reward for applying himself academically.
Access to electronic resources were a motivating factor in John's learning environment, he was prepared to dedicate much of his own time to increasing his knowledge of new technologies and then applying this knowledge to other areas of study. John had a very clear understanding of the use and application of these resources and although he had been totally against any other form of information at the outset of this research,

he did change his attitude as his knowledge increased. He was able to make informed choices concerning the appropriateness of the resource to the need. Much of John's success with electronic resources came from independent learning and extra tuition, John claimed that everything worthwhile that he had learnt concerning electronic resources, he had learnt outside of school. John was the most technically competent participant in this study.

PAM.

Pam had one sister and two stepsisters, she lived with her mother on a small council estate in an industrial town on the river Tyne. Her mother worked part time at a local factory where her sister also worked, her sister lived in the next street. Pam saw her father regularly although he has moved out of the area and remarried. He had two stepdaughters and Pam often went to stay with them during school holidays, she appeared to have a very good relationship with her father, his wife and her two daughters. There was still some friction between her mother and father and they never meet, Pam was always taken to her fathers' house by her elder sister or met by her father at her elder sisters' house. Pam did not feel that her loyalties were divided but she did say that it was often quite difficult not to feel envious of her stepsisters. Pam had a number of friends at school but she tended to spend most of her time with friends she has made at the Air Cadets. She had been a Cadet for a number of years but claimed to be loosing interest, it had always been her ambition to join the Royal Air Force but this was changing by the time the fieldwork began.

Pam had no access to a computer from home but she did have access when she visited her father.
Pam was a member of the public library and used the local branch and the central library regularly. She was an avid reader of fiction and often stayed in the library to read as it was 'peaceful' there, she also had a tendency to forget which books she had taken out and frequently allowed her loan period to lapse. At this time Pam had access to electronic information in the public library, and extensive access at school. Pam was very impressed with the level of access at school but this changed when the new system was introduced. She had carried out a search for information on 'adult literacy' during the first term after the new system was installed. She used the term 'adult literacy' to search and each time she typed in the search term she received a message telling her access was forbidden. This happened three times and Pam kept repeating the search because she did not understand what was happening. After the forbidden warning had been activated three times Pam was banned from the system and her password was deactivated. There appeared to be some problems with the new system and because it was new there was some difficulty in returning Pam to active status on the system. Although she could prove that it had been a genuine mistake she remained excluded from the system for the entire autumn term, this was until the technician had received the necessary training on the new system.

During the course of this autumn term Pam only used the library once, she began to go to the central library for the majority of her information needs. Pam had never been shown how to use the library at school, she had been given library instruction from a librarian at the public library but that was limited to hard copy searching. Her friends at school had showed her how to access the Internet and she had been a frequent user of chat lines during year 9. Access to these was forbidden by the new system so, although Pam was frustrated at being denied access for no apparent reason, she claimed 'it was no great loss' as she could not go on the chat lines anyway. This and the fact that she was denied access unfairly caused her to feel a great deal of animosity towards the school.

Pam preferred to access electronic information resources at school and when she was denied this opportunity she rarely tried to access any of these resources from the public library. Geography was one of Pam's favourite subjects although she frequently had problems locating relevant information. Pam spent a great deal of time working on the presentation of her work, sometimes this resulted in the work not being completed on time. She had failed to hand in two required pieces of course work during the fieldwork and she was unsure how to make up for the marks she had lost. Pam had trouble dealing with the quantity of information she located on the Internet, although she did continue to claim that this was her principle resource for school-related information, and her most useful. She said it was easier and quicker to use than any other resources available to her. She claimed that the length of time it could take to locate something did not matter as it was fun searching so the time passed quickly.

Pam, as a frequent user of chat lines, was aware that perhaps she spent too much time on this activity but she enjoyed it and tried very hard to find a way of gaining access after she was allowed back on the school system. Pam did say that she was findings the 'digital shorthand' she used on chat lines was 'creeping into' her formal school presentations and reports.

Pam was a frequent user of electronic information resources but she was not confident in her ability. She preferred to work alongside her friends in the library and found it very difficult, as the policy was 'one person per machine'. This was usually overcome through the use of email, but it was a longer process than simply asking someone who was looking over your shoulder.

Summary.
Pam had a very mature outlook, she wanted to own a computer more than anything else, but she was well aware that there was little possibility of that in her current situation. She did not complain about this and said that as long as she had access somewhere then it was not a problem.
Electronic information resources encouraged Pam to carry out research that she would not have attempted before, although she was an avid reader of fiction, she did not enjoy book research. Her use of chat lines had improved her skills at navigation in the digital environment and given her confidence in her ability to learn.

RUTH.

Ruth had three sisters and one brother, she lived in a large detached house within easy walking distance of school, and two of her sisters were still at home as was her brother. She shared a bedroom with her younger sister although she was not happy about this and spent a great deal of time pointing this out. Both of Ruth's parents taught at local schools and both saw technical skills as a priority for their children.
Ruth was a very private person, she was not particularly confident in responding to questions and always clarified that she had understood every question before she responded during taped interviews. During observations she was much more open and was happy to chat about her activities, often telling the researcher things that were not asked about. At the beginning of the study she was very conscious of what her friends would think but towards the end she ceased to make any references to this at all.

Ruth had access to a computer in the bedroom she shared with her younger sister, there was also a computer in her brother's bedroom and one in a downstairs study, which belonged to everyone but was usually used by her parents. From the computer in her bedroom Ruth used a number of CD ROMs including Encarta and Compton's, she also spent a lot of time on her Sony Playstation. Access to the Internet was only available from the computer in the study downstairs and her parents strictly monitored use. Access was restricted to certain sites and access time was limited, all of the children in the family used the Internet but they would always explain why they were using it before going on. Ruth accessed the Internet from school every lunchtime whilst access to chat lines was available, once these were banned she no longer came in to use the computers. She said that every autumn term when the new year 9's start it was impossible to get a machine at lunchtime. She said this was understandable because she had been the same, coming from a middle school with no open computer access everyone tried to go on at every available moment. Although there were CD ROMs available in the library Ruth did not know where they were or how to get access so she 'never bothered trying' to use them. She was not allowed to go on chat lines from home and as she had made a number of email pals, school was her only opportunity to talk to them. She said her parents were considering allowing her to use chat lines after they had been banned from school but this did not happen during the fieldwork.

Ruth also has access to electronic resources from her public library although she never used them from that location, she was a heavy library users but only for fiction and printed reference. She said she did not like the computers in the library, and 'more to the point [she] did not like paying for it.' She did not see any need to spend time in the public library doing things she could do from home or from school.

Ruth preferred to work in the school library, she said it was easier to get help from her friends if things went wrong. There was always someone in the library who was able to help, although technicians were available Ruth preferred to ask her friends because 'they talk in words that make sense, words you can understand.'
Ruth enjoyed Maths and Science, she liked subjects with clearly defined parameters, she said she did not feel comfortable discussing opinions, she preferred to look for information, confirm it was accurate then respond to the homework question. Ruth always used the Internet or Compton's for science questions, she would use Compton's then go to the Internet sites they recommended, that way she said she could 'feel pretty sure the information was okay.' It was also possible to confirm this information from printed sources if she felt she had to. Ruth enjoyed this type of exploration because there were definite boundaries.
She did not like using the Internet to research questions, essays, or reports in subjects that depended on personal opinions. She said she felt very uncomfortable expressing her opinions and did not feel as if she could rely on the Internet, as that was also personal opinion. Ruth said that if she had to write essays which relied on

her personal views she preferred to use printed material to support her ideas because that way they seemed to have more credibility. She was not sure how to judge information from Internet sites. She knew it was useful to use a reference CD ROM like Compton's and her parents were very strict about using the Internet from home, but she said that this really did not help her to make decisions about material on other sites. She thought it would have been useful if the school had developed an Intranet and provided links to sites which could be relied upon. She said that her friends thought this would be boring but Ruth pointed out that it would still be possible to explore but there would be the option of having 'safe sites to use for homework.'

Ruth was able to conduct fairly complex searches using electronic resources but she did not feel particularly confident about her behaviour. She asked questions a lot of the time and often gave up because she was convinced she was doing the wrong thing. She had a strong interest in new technologies but felt as if there was not enough being done to teach people how to make the best of these technologies. Ruth said, 'I always feel like I'm missing something, you know, I've finished but I've failed because there's still loads out there I didn't find.'

Summary.
Ruth came from a very secure home background, she had access to many resources and was encouraged to use them in a thoughtful way. There was limited knowledge of the resources at home and this tended to lead to a more restricted approach to access. Ruth used resources in a very pragmatic way, depending upon the subject she was researching. She felt very unsure in the electronic environment unless she was researching 'facts' she did use these resources frequently but in a very limited way.
Ruth preferred to study subjects with definite right and wrong answers, she felt very insecure when she was asked about her own ideas. During this research she it had taken her along time to accept the fact that it was ‘her’ that was of interest to the research, there were no ‘right and wrong’ answers, only her perception. This was a difficult obstacle to overcome in this case.

Appendix 8:
Participant Profiles from Site D

KAREN.

Karen was 13 when the fieldwork began, she lived with her father, mother and older sister in a large house 5 miles outside of the town. Her house was isolated and all of her friends lived a car journey or bus ride away. Her father had a professional post in a commercial organisation and her mother was a full time housewife. Karen enjoyed horse riding and wanted to become a veterinary surgeon when she left school. This had been her only ambition for as long as she could remember. During the fieldwork she had to organise her supervised work experience placement and she got very impatient with the number of students who requested placements with vets and the RSPCA. She was sure they did not all want careers in that direction and she thought they were only trying to get an 'easy option'. This was characteristic of Karen, she had very strong views and was not afraid to voice them to both the researcher and to staff and other students.
Karen had no strong feelings about school, she did not like nor dislike it but she did appreciate the need to do well if she was to attain her goals. She had established what she needed to get to vet school very early on. During the initial interview she was able to tell the researcher what her subject options would be and what grades she needed to achieve in order to fulfil her ambitions.

Karen had access to the Internet and CD-ROMs from home, there were three computers in the home, one that she shared with her sister, one used by her mother and father and her father also brought a laptop computer home from work. They were all allowed to use this if no other machine was available. Both of her parents were IT literate although her father was definitely the expert in the household. He had added more memory to the computer shared by Karen and her sister as they were beginning to use it for more and more school-related work. There was also a new computer at the paternal grandparents' home, which Karen used when she visited at weekends. She said that although her grandfather did try very hard, he was having some trouble 'getting to grips with the technology.' Although there was awareness in the home of the need to use electronic resources there was also a heavy emphasis on printed material. Karen had access to a large personal library at home that she used for a lot of hers homework assignments. Karen did not use the Internet very often, she was 'more comfortable' with printed resources and Encarta. She also had access to email from home but had not used this at the beginning of the fieldwork. She did begin to use it but was not particularly impressed with it, she was well aware of the potential benefits but did not feel at this point that it was of much use to her. Her father used email regularly for work and her sister had used it but Karen saw it as yet another distraction that as yet she could not justify to herself. There were no formal restrictions placed on what sites Karen could access or the length of time she spent on the Internet. There was only one land line to the house and Karen said, 'with all of us trying to work, talk or make plans, you have to think about each other if you are going to hog the phone line.' Karen said that in the majority of cases her father would be with her when she accessed the Internet because she often needed his help, there was no need to place restrictions, as he was there to see what was being used.

Karen had never used the Internet at school when the fieldwork began, she was aware that access was available but she said that she had not tried to find out when and where she could use it because she preferred 'going on at home.' She had used the networked CD-ROM's from the library but she had never used the new CD-ROM's that had to be individually loaded on the computers in the library. She was not aware of which were available nor did she know how to find them. She thought this was probably because she had never tried. Karen was very self-reliant when it came to resources for learning.
Karen rarely used the public library as she lived so far away, there was a mobile library van, which came to her house, but she rarely used that either. She pointed out that the public library did not offer access to electronic resources as far as she was aware and her own book collection was more than adequate for her needs.

Karen wanted to be a vet, she had found out which A levels she needed and which GSCE subject choices would provide her with the best grounding. At thirteen she had already decided that she was aiming for at least three 'A' levels, 2 at Grade A and 1 at Grade B.

This was indicative of Karen's approach to learning too, she had very specific goals and she had identified how best she could achieve these. She had established that she was a 'deep' learner, she needed to interact with information before she could internalise it, and she needed to internalise it before she felt she really understood. She preferred it when she was given tasks that had definite right and wrong answers yet she did not

like using electronic resources to copy and paste 'facts' about a subject. She said that she could never learn anything by taking information like that, she had to read it, think about it then write it for herself.
Karen was not very comfortable when it came to expressing personal opinions, yet she did have very strong opinions on a number if issues. The issue for Karen was academic attainment and her own personal learning experience. Karen preferred to access electronic information resources from home, she felt more comfortable in her house with her own things around her. She was very sceptical about the quality of information she accessed through the Internet. She had found some information on horse riding from an American riding school, when she read it she was rather angry to find that it actually gave what she regarded as 'false' and 'inaccurate' information that could result in injury. She claimed that it described how to mount a horse in such a way that the rider could be in danger of being dragged by the horse and be powerless to right the error. This had alerted her to the possible dangers of taking too much for granted, had she not known the information was inaccurate she may well have believed it because of the source.
Karen was also very reluctant to seek guidance outside of the home. She said that she did not ask how to use some of the resources at school because she would have felt foolish. She was more comfortable asking her father, he also had more time to show her how things were done. Karen was rather concerned that other students who did not have this level of support at home may well have been disadvantaged.

Summary.
Karen came from a very secure home background, her parents were very supportive and had high aspirations for her. They were prepared to support her in any way necessary and her school life always came first. She had access to many information resources from home, both printed and electronic, so she did not have any dependence on school or public library provision. She also preferred to access these resources from home, living a considerable distance from both school and the local library encouraged this attitude, she could not stay behind after school because she relied on the school bus for transport.
Her parents were familiar with new technologies and were able to offer her support and guidance from home. Karen was a highly motivated student, she was motivated by her own ambitions and did not consider school to be anything other than an obstacle to be surmounted in order to attain her goals. She was very aware of popular images of electronic information resources but they did not move her. She evaluated resources on the value they held for her and she was not prepared to spent vast amounts of her time becoming familiar with the use of these resources. Email had been available to her for some time but until she saw some real value in using the resource she was not prepared to devote time on familiarising herself with it.

LEE.

Lee lived with his parents and a younger brother who attended middle school, he lived very close to the school, he had always lived at the same address, grown up with the same circle of friends from 'first' school. Lee's father worked for a local manufacturing company and his mother worked in a small store in the centre of the town. Both parents worked full time and Lee was responsible for collecting his younger brother from school every night and taking him home. He said he usually had to make some tea because they were both big eater but the family would have their evening meal together when both parents returned from work. Lee said he had no choice about collecting his brother and he said he did not really object although he could think of better things to be doing. Lee was fourteen when the fieldwork began and he was very keen to be involved. He was very willing to voice his opinion and became very enthusiastic about the research. He frequently asked questions about the progress of the study and always wanted to know what would be happening next.

Lee had access to a computer at home but he did not have Internet access at the time of the research. He said that he thought it was vital to have access and he spent a lot of time trying to convince his parents of the value of the resource. He did use the computer for word-processing, games and CD ROM use. The computer was in the bedroom Lee shared with his younger brother and both had access, although Lee admitted that he usually dominated the computer and argued that he needed it more for school. Neither of Lee's parents were familiar with the technology and they did not want to learn, Lee said his mother had enough trouble with the electronic till at work when she first went back. That had been 'enough to put her off computers for life.' The father had often commented on the inevitability of having to learn at some point but it was not something he wanted to do. They did encourage both children to use the technology and Lee said they would get access to the Internet eventually.

Lee was not a member of the public library although he did live very close to the central county library. He said there was no need to join, there was no access to the Internet or any CD-ROMs and he could use the books at

school. He thought the school provided a better service for him than the public library and he said that when he was looking for reference material he felt more confident using material from the school library.
Lee was a reader of fiction and borrowed regularly from the school library, he used the school library at lunchtimes and sometimes before school in the morning, he could not stay behind, as he had to leave and collect his brother. Lee said that Internet access was very difficult, it was often available in one of the 'IT' teaching classrooms and they were allowed access during taught periods. Lee claimed this was the only real chance he had of using the Internet, it was possible to book the one machine in the library that had Internet access but sixth form got priority. Apparently the sixth form used the resource heavily and it was not possible to find an available time slot over the lunch period. Lee did use the Internet and Compton's CD ROM at a friends house whenever he could, he thought he was learning more there than anywhere else.

Lee was working on an anti-vivisection leaflet at the beginning of the fieldwork, he had chosen to produce this leaflet as part of a joint assignment for English and RE. The class had been given one taught session using the Internet to locate information for their chosen topic. Lee had found lots of information and said that he thought the Internet was easier to use than any other resource he had tried before. He was very pleased that he had been able to locate so much information and it had been relatively easy. He had printed out a lot of information from different web sites and had taken it home to help in the production of the leaflet. He had not read any of the information in detail at the time of this initial interview but was very please that he had so much to work with. It was the ease with which the information had been located that impressed Lee, he said that he had found 'loads' of sites and all he did was 'clicked open the first few and got loads of stuff'. A week later Lee was very disappointed, he had looked at the information and found that, although some of it was useful, the bulk of it was personal opinion expressed by an anti-vivisection group and the factual content on the material he had printed was very limited. He had also thought he had taken information from 'at least five different places' but the same group was credited at the end of four of his five pieces of information. Much of the detail was repeated and he was not very sure what to do with it all. Lee said it was his fault for not reading it at the time but he wanted to print out as much as he could during the lesson, as he did not know when he would get the opportunity to go on the Internet again. Eventually Lee used Encarta, leaflets from an organisation, a book from the school library and some of the information he had retrieved from the Internet to produce his leaflet. He was disappointed because he thought he would be able to produce the whole leaflet by using the Internet.

Later Lee used 'copy and paste' and take notes from a number of sites during a search for 'desertification' in Geography. He said a friend had shown him how to take the relevant pieces from the pages and put them in a word file, that way he only had to print out the pieces he really needed. He thought this process was more time consuming but he said that the material made more sense to him this way. Lee would have liked it if he was able to save his findings to disc then use 'copy and paste' to produce his work. It was not possible to do this as they were not allowed to put their own discs in the computer.

Lee enjoyed having his friends around when he worked, he enjoyed doing homework in groups and said he learnt a lot from working with others. Not having access to the Internet at home made it difficult for him to learn how to use it and to understand what he could trust and what he could not. Lee had not had any formal training on searching the Internet and had a very limited knowledge of what was available.
During interviews he was very confident about his ability to use electronic resources but this was rarely demonstrated during observations, he spent a lot of time looking around with very little purpose. Electronic resources did encourage Lee to do research, he said that even if it was slow and even if he did have problems finding what he wanted, it was more fun than using anything else to research a subject. He was sure that as his experience increased and he continued to learn new things from his friends, he would get much better. The thing Lee liked most about moving from middle school to high school was the amount of freedom he had, he did not lessons where the teacher prescribed everything, and he enjoyed investigating things for himself. He was aware that he still had a lot to learn but he was sure that this was the best way for him to do it.

Summary.
Lee enjoyed school, he had lots of friends and although he was not a high achiever, he took his learning seriously and knew it was important to work hard. He did not have any career plans at this stage but he was very interested in technology. Lee had a lot of responsibility at home and was aware that sometimes he missed out on opportunities at school because of this, there was no evidence of any bitterness, he just tried to make up for it in other ways. Lee had a lot of confidence in his technical ability, sometimes this was not always demonstrated and on these occasions he was inclined to blame the technology. He was very reluctant to seek the advice of adults but regularly sought help from his friends.

MATT.

Matt lived in the centre of the town very close to school, he had two younger sisters, his father worked full time and his mother was at home full time. The family was very close and discussed most things openly. Matt was very close to his sisters although sometimes he said they could make life difficult. He was thirteen at the beginning of the research and very pleased to be involved, he asked a lot of questions about the research and was very keen to take part in observations and interviews. During focus group sessions Matt usually dominated the session when he could and he could always be relied upon to contribute. If the discussion began to loose direction the researcher rarely had to intervene, Matt became a self-appointed chair and everyone was quite happy for him to take on this role.

Although Matt liked school, the academic aspect did not take priority for him, he was on the school rugby team, the school cricket team and a member of the drama group. These were the most important aspects of school for Matt, his parent and his younger sisters always came along to watch matches and plays. He enjoyed school, lessons were a lot more fun now than they had been at middle school.

Matt did not have a computer at home and this was a great disappointment to him, the only 'computer' in the home was a 'VTECH starter' set belonging to his youngest sister. He thought it was very important that she had this because it was preparing her for more advanced machines. Matt thought that school access to electronic resources was good, he stayed behind every night, if he did not have a club meeting he would go in the library, which was usually twice a week. He said that he also had access before school and at lunchtime, he said he could always get a machine at lunchtime but he booked well in advance. He used this time for homework, if he could get everything done at school it left his evening free and this was important to Matt.

He was a member of the public library and he was a regular user, there was no access to electronic information there but he would take his sisters and they would all change their library books every two weeks. Matt was a skilled library user, he used the OPAC in school and the card catalogue in the public library. He regularly made requests for material from the public library for both himself and his sisters, he did not think he would use electronic resources in the public library, he said they did not like to stay there, once they had got what they wanted they left.

Matt spent a lot of time at his best friend's house, every evening after tea they would go on the Internet. These sessions were rarely for homework, at the beginning of the research Matt and his friend had 'met' two girls in a discussion group on the Internet and he thought this was quite exciting. By the end of the fieldwork they were spending every evening emailing each other, when asked if he had any intention of arranging a meeting he was very unsure. He said he did not think he wanted to, it would change things and he was quite happy for things to go on as they were. Both girls lived in Kent and Matt was more than happy about the distance between them.

Matt wanted to join the Merchant Navy, he had always wanted to, his uncle had been in the Merchant Navy all of his life and every time he came home he stayed with Matt's parents. His uncle had already made inquiries and there was a post for Matt as soon as he finished school and he was very keen to start. Matt thought he would stay in the Navy until he was thirty then he would think about another career, as yet he did not want to think that far ahead. He wanted to see the world with no responsibilities before he started to think about what to do next.

Matt enjoyed the freedom of high school, he liked to research subjects for himself but when it came to homework he said it was 'nice to know what the teachers want[ed]'. He did not like it when his final marks depended on his interpretation of an assignment, and this type of homework was beginning to increase.
Matt would have liked to have a computer at home, he never worked on his friend's computer, that was exclusively for 'fun' but he had discovered how to search the Internet from there. He said if he had a computer at home he could do his homework there, but then he added that he would probably still do his homework at school in the evenings and only use his own computer for fun. He said they had never used his friends' computer for ant school-related work at all since coming to the high school.

Matt was very comfortable working in the school library, he never encountered any organisational problems and access was always available. Matt was a very busy person and it was necessary for him to organise his time well, he would regularly use the booking system to make sure he had access to resources at lunchtime and on

certain evenings. This was when he researched his homework. He always wrote up his assignments during these times, and used the school printer to produce his work. He enjoyed being in the library because when he needed 'expert' help, it was always available. He was very aware of what was available, although he enjoyed the Internet he did not feel it was always his 'best option'. There was a History database, which he used frequently, and he knew how to access both the networked CD-ROMs and the ones that were available from the librarian. Matt said that everyone had been given library instruction classes when they arrived in year 9 and all of this was explained at the time.

The piece of work Matt remembered the most was a project on 'alcopops' which had involved a report and a presentation to the class. Matt said that if he had not had access to the Internet it would have been very difficult to do this project as the subject was so 'new'. He had used newspapers but his major source of information was the Internet, he wanted to examine the images advertisers used to promote the drinks to teenagers and he found more than enough material for this. Matt had organised his information in a folder on the school network, he had wanted the entire project to remain in electronic form but he had to print out the report. Matt used online newspapers, school databases and individual web sites to create his presentation, the quantity and quality of the work demonstrated the amount of time and effort that had gone into the project but Matt said it 'wasn't like real work, it was fun'.

Summary.
Matt was a confident and outgoing young man, he was an active member sports and drama clubs who had the support and encouragement of a close family unit. Matt was very focused and had a very clear picture of where he wanted to go in life and what he wanted to do. He approached his responsibilities in an organised and positive manner and managed his time exceptionally well. He enjoyed both the social and academic aspects of school and he was very keen to take advantage of all that was available to him.
Matt had only one complaint, he did not have a computer at home, although he did want one he knew that his parents could not afford to buy one and he admitted that it was not essential. He could live without it although he would prefer not to. Matt was highly motivated, he did not appear to need encouragement to try new things and get involved with groups that interested him. Working with electronic information resources had encouraged Matt to spend more time working on his academic projects than he would have chosen to do in other circumstances. He had become very familiar with the technology though access at school and at the home of a friend.

NICOLA.

Nicola had four brothers, two sisters and one brother-in-law, she lived with her parents, three brothers and one sister, and she was the youngest female member of the family. Her father was a long distance lorry driver for a local firm and her mother was looking for work at the beginning of the research. At the close of the fieldwork she had enrolled on an 'IT' course in an attempt to increase her options in the job market.
Nicola has a good relationship with her siblings but she would have liked a bedroom to herself. Nicola had moved to this town from a much larger city, at first she had found it difficult but she liked her school, liked her new friends and was pleased to be living 'out in the countryside.' The major drawback for Nicola was not being close enough to the city to go shopping there with her friends, she was allowed to travel into the city but only when accompanied by her elder sister. This changed during the research and Nicola was spending every Saturday in the city centre window shopping with her friends.

Nicola had no access to electronic information resources at home, she wanted to have her own computer but she never thought it would be possible while she was still at school. She said it would be the first thing she bought when she got a job.

Nicola was a member of the public library and she used it frequently. There was no access to electronic resources in the public library but there were computers. She had used these to word-process some of her homework assignments but there was a charge, her sister had paid for her on those occasions.
Nicola dependently completely on school to access any electronic information resources, she used the networked CD-ROMs, school databases and the Internet. She was aware that there were other CD-ROMs available but she did not know how to load them and had never asked about them. She came to school at 8.15am every morning in order to go to the library before the school began and she used the library at lunchtimes and in the evenings when she had research to do. Nicola had been shown how to access the Internet in an 'IT' lesson and she was aware of the procedures for access the Internet from the library. She said that the computers in the library were always busy, usually occupied by the sixth form or the boys, but if you used the

booking system it was possible to get access every day. There was a code of practice that was not written down but everyone knew about it, if sixth formers had urgent work to do they were allowed to override the booking system. Nicola said this was fine because it also applied to everyone else in the school, if you had to do something and there were no computers available the librarian would always ask if anyone was prepared to give up their time slot. She said that there was nearly always somebody who was prepared to allow you to use the computer, it was 'sort of a courtesy thing.'

Nicola did not enjoy the academic side of school at all, she had a lot of problems with all of her subjects except Art, which was her favourite. She pointed out during the first interview that she was in the bottom set for everything and wondered if this was why she had selected for the research. She was relieved to discover that access to electronic information resources had been the criteria for selection but she referred to herself as 'thick' in every meeting. Nicola had a very low sense of self-efficacy at every level. She had ambitions to be a fashion designer but had already decided that she would 'probably end up in Dorothy Perkins or Dolics if [she] was lucky'. During the course of the research Nicola was moved up to a higher set in English and she contacted the researcher with this news before the net scheduled meeting. Nicola did not like project work, she enjoyed doing it but felt very nervous when it came to handing it in, she was never sure if she had done the right thing. She thought it was much easier when teachers gave you questions and you had to answer them.

Nicola was designing a leaflet on whale hunting for a joint English and RE project, she had looked in the Internet for information but she did not use any of it because she was very unclear about the origin of the information and the accuracy. She said it appeared to be very 'one sided' and she was not sure how she could use information like that. She had found an article using the Encarta CD-ROM and she used that to provide a history of whale hunting for her leaflet. She said she was against whale hunting and she need to find information that supported her argument but she felt she could not use the information on the Internet because it might not be true. During an observation she located a page with details of trends in the whale population, she said this would be useful and copied the information from the screen, she did not record the site location and later in that session she was unable to find the site again. She became very angry with herself and left the Internet to work on Encarta. Nicola did not include any of these statistics in her final project.

In a subsequent observation Nicola was doing some work on 'Art Nouveau' for an Arts project, she had a note book beside her and she copied down every address of the sites she thought would be useful. She sad she did not like using the Internet for this sort of thing, it was too difficult to decide what she should use and what she should not. She decided to try and use one of the newer versions of Encarta for this project, she had not loaded a CD before and she was slightly unsure about what she had to do, this did not stop her from trying and she succeeded on her first attempt. She later decided that as it was concerned with historical detail it was probably irrelevant to use an updated version but she said that at least next time she would know how to do it.

Nicola used printed material, CD-ROMs and some school databases for school-related work and said that the Internet was great but only for 'stuff about different bands and fashion stuff.'

Summary.

Nicola was part of a large family unit, she had a good relationship with her sisters and, although she did not spend much time with them, she also got on well with her brothers. Nicola was not highly motivated academically, she wanted to do well but had decided that she was not 'very bright' and did not feel it was within her power to change this. She frequently failed to hand work in on time and she made no attempt make excuses for this. She had resigned herself to a career as a shop assistant but she did not want this, she thought that anything else was beyond her capabilities. There was no evidence of ambition, she did not talk about becoming a shop assistant in terms of a career, it was merely a means of earning.

Nicola enjoyed using electronic information resources but the Internet was too ambiguous, she could not cope with the responsibility of having to make choices and evaluate for herself.