Conceptual frameworks and models for effective delivery of distance education: a planning aid tool derived from multiple case studies

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Conceptual Frameworks and Models for Effective Delivery of Distance Education
A Planning Aid Tool Derived from Multiple Case Studies

By Tei Barnhart

Doctoral Thesis
Submitted in partial fulfillment of the requirements for the award of Doctor of Philosophy at Loughborough University

March 20, 2002
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Abstract

Human factors can have a profound impact on all aspects of distance education from planning through to the delivery and resultant learning. For example, where governments are seeking to reduce the amount of funding into education, educational institutions are increasingly looking for sources of funding other than those derived from government. Furthermore, relevant human resources are still scarce, since not every member of staff has learned how to master the effective delivery of distance education. The up-front cost of distance education is still a concern. The work carried out in this thesis involves a series of field studies that were conducted in the context of multimedia distance education. This research investigated the way multimedia distance education could be examined from a human factors/ergonomics perspective. Normally, research into the evaluation of a distance education programme consists of measurements of students' scores or comparisons with traditional (face-to-face) education. However, this research investigates this phenomenon by considering the socio-technical implications derived from implementing distance education in an educational institution.

The current socio-economic pressures, imposed by government bodies and funding agencies, to make higher education available to a broader audience in society, create a perfect context for higher education institutions to seek alternative solutions to traditional educational practices. For many higher education institutions (e.g., universities), distance education seemed to be a perfect solution to respond to these pressures because it reaches a wide audience (e.g., adult working professionals) who would not otherwise be able to attend campus-based classes due to work, family, or social commitments. Adult working professionals are suffering pressures from their superiors and from the limited job availability in the market place, to constantly update their knowledge and skills to cope with current challenges such as the mastering of new network technologies and thus to maintain employability. In light of this, research on distance education suggests that it has been regarded as the economic solution for reaching a broader audience. Even though distance education may appear to represent an economic solution to the problems of resource availability and access to educational opportunities, attention must be paid to the underlying human factors issues that affect its effectiveness and can lead to an increase in the pressures suffered by the social system.

The need for systematic planning has also been well acknowledged in the literature reviewed. However, the literature is rather fragmented and does not cover all the necessary issues from a systems view of distance education. Some previous research has focused on a particular issue, or on a combination of variables but none has attempted to structure all the most relevant issues and factors into a single conceptual framework. Another problem is that the effectiveness of distance education has not always been fully planned before its implementation. Many institutions of higher education are rushing into delivering distance education without fully understanding how it affects students' learning and lecturers' teaching. The new educational technologies have been changing instructional practices and affecting the way instructors teach, students learn, educational institutions manage education, and managers plan education. This tremendous impact has been witnessed in institutions of higher education that are beginning to deliver instruction at a distance. However, the literature reports that some of these institutions are constantly upgrading, improving, or having to re-design an ill-designed distance education programme. Without careful management, and planning, a number of undesired outcomes can result. Even though modern technology has overcome not only the constraints of place but also of time, these are often implemented without fully understanding their impact. However, there has been some research into the development of conceptual frameworks for situating information and communication technology within organizational structures and social processes in order to contribute to better policy and management decisions around the uses of information and communication technologies. Nevertheless, the impact these technologies and the distance mode of delivery have on stakeholders of an educational institution have yet to be further examined. This thesis focuses on conceptual frameworks and models for the planning of effective distance education programmes. A series of socio-technical frameworks and models were built regarding the issues surrounding network technologies in such settings.

As a result of the open-ended nature of the research questions, the strategy adopted was the naturalistic approach because it offers the means of identifying crucial contextual and environmental issues that are typically ignored by the positivistic approach, although elements of positivism were adopted when appropriate and necessary. Therefore, the research reported in this thesis adopted a series of case studies in their natural environment and used the real stakeholders, mainly lecturers and students, as a source of data, which were partly quantitative and partly qualitative. Qualitative data were used to clarify quantitatively derived findings (Hiratsuka & Eason, 2001). The fieldwork was divided into four in-depth case studies. Likewise, each case study was divided into sub-case studies.
according to the research needs. A taxonomy of distance education was developed taking into account the means of communication used, and case studies were selected to cover, as much as possible, the full gamut of computer-based distance education. As such, the first three case studies selected for this research covered the entire computer-based distance education from the taxonomy and the fourth case study included a set of sub-case studies of distance education being planned. The fieldwork was divided into two main parts, (1) the three case studies of existing distance education programmes, i.e. case study A, B and C; and (2) the case study of distance education being planned, i.e. case study D, which was further divided into seven sub-case studies. In case studies A, B and C a sample of lecturers and students were surveyed to assess the effectiveness of distance education delivery. Surveys for these case studies adopted interviews, questionnaires, and classroom observation. Surveys for case study D involved semi-structured interviews and Likert-type questionnaires, both designed by the author.

Case study A was concerned with on-line training at a distance. A local college provided a good opportunity to obtain awareness of this means of delivery as well as to learn more about how tutors and learners feel when they are teaching and learning at a distance. Case study B related to delivering distance education by videoconferencing. A university in Northern Ireland provided an appropriate setting for conducting this fieldwork. To complete the investigation of the computer-based distance education mode of delivery, case study C was concerned with distance education through multiple technologies delivered through the Internet. A university in North America provided the appropriate setting for this investigation and evaluation. To investigate the use of multiple technologies as a means of delivering DE as well as to evaluate its effectiveness, surveys were carried out with the stakeholders. The large number of individuals surveyed made it possible to use quantitative data from the surveys. However, each case study was also analysed individually because of the different contexts and thus environmental factors. As a result, qualitative data were extremely useful for an in-depth understanding of each case study. The first three case studies carried out in three different settings around the world allowed for acquiring a more holistic understanding of the impact diverse technologies have upon the main stakeholders (i.e. lecturers and students), and the issues surrounding them when teaching and learning at a distance.

The next step in this thesis was concerned with a cross-case study analysis in order to identify common issues across case studies A, B and C. As a result, conceptual socio-technical models were built to explain these results. The important lessons learned from these case studies of distance education delivery, and from the literature review, led to building a range of conceptual models and frameworks of planning distance education to add value to the current state of the art in research of this kind. For example, most research in distance education has been confined to a single institution and often to an individual course. There has, therefore, been limited potential for developing generalizable theory and for building generic models. A single conceptual model (the planning aid tool) of effectiveness in delivering distance education sought to pull together the many diverse elements surrounding the field of distance education delivery. Although the focus of this work was upon distance education settings, the frameworks and models held the potential of furthering the understanding of the implications distance education technologies had for stakeholders, and the relationships between social and technical systems of distance education delivery. This development was motivated by the research that Goodman published in 1999 on "Validating factors that impact on the success of distance learning initiatives". The distance education planning phase requires the consideration of a number of issues (variables) that need to be examined. However, identifying them was the first step in pursuing a model of effective distance education. The fourth set of sub-case studies D1-D7 (case study D) was carried out to test the frameworks and models. The results from this test were then examined to identify new important issues that emerged from the case studies. Thus the frameworks and models were reviewed against the results and a more complete version was then developed. Therefore, this fourth case study (D) tested the reliability of the frameworks and models previously developed. A total of 125 individuals were surveyed on an individual basis (79 students, 35 lecturers, nine managers, and two technicians). The frameworks have proven successful but minor additions were necessary to complete them so that they can be used as an effective tool for the planning of future successful distance education programmes in the UK. Furthermore the work conducted in this thesis achieved the aim of providing an answer to one of the research questions posed by Goodman in the article mentioned earlier: "Is it possible to prioritise the variables that impact on distance learning in terms of importance?" (p.20). In Goodman's work, factors that were considered by the programme manager of each case study were identified, but it was not possible to measure the importance level of each factor. This was due to the limitations of the methods and materials used in his research. Therefore, the work reported in this thesis overcame this gap by using a Likert-type of questionnaire with seven staff members who were directly involved in the planning of distance education programmes during this survey (case study D). Eleven new factors that need careful consideration when planning effective delivery of distance education arose from the work conducted in this thesis:
(1) Access to infrastructure like on-line libraries services for the distant students;
(2) English support for international students, and counselling; communication and group work activities;
(3) Implications of communicating at a distance through a variety of Network tools;
(4) Implications of the use of the technology for mediating instruction;
(5) Implications of the use of the technology for DE delivery;
(6) Implications of the use of the technology for the diverse support services to the distant student;
(7) Allocation of roles and responsibilities for staff members to deal with distant students;
(8) Decisions about the appropriate balance between DE and TE;
(9) Internal and external accreditation;
(10) Support for disabled and special needs students at a distance; and
(11) Study and learning skills support for distant students.

From a socio-technical perspective, this thesis raised a discussion about the level to which social systems have to accommodate and to what extent technical systems can be designed to minimize such accommodation. Long term and high levels of accommodation by the social system can lead to severe human costs. Research in human factors is committed to the optimization in the interaction between social and technical systems so that it seeks to avoid severe human costs. However, social accommodation is intrinsic to human nature and that capability, to a certain extent, is vital and it is what makes the whole system work effectively. Therefore, there is a very thin line between the extent to which a social system can accommodate in order to promote a healthy and harmonic interaction with the technical system, and yet not to the extent of leading severe human costs such as disillusion, depression, anxiety, sleep deprivation, and impaired learning.

From a holistic perspective, it is safe to assume that effective DE is more the result of planning and preparation than innovation or sophisticated technologies. While more research is always needed, because the concept of research is a dynamic process rather than static, a substantial research foundation has been achieved. This leads to the conclusion that teaching and learning at a distance can be effective, provided that the issues identified, examined and discussed throughout this thesis and summarized in the form of a range of conceptual frameworks and models, are taken carefully into consideration prior to and during the early stages of planning a DE initiative. The value added to the field intends to provide a more holistic array of factors that need to be taken into account prior to the delivery of distance education, in particular by decision and policy makers.

Key words:
- Distance education
- Distance learning
- Conceptual framework
- Holistic framework
- Conceptual model
- Socio-technical model
- Planning aid tool
- Multiple case study
- Effective delivery of distance education
- Social system accommodation
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Chapter 1

Introduction – Human Issues in the Use of Multimedia Distance Education

1.1 Chapter outline

This introductory chapter presents an overview of the problem to be addressed, human issues in Multimedia Distance Education (MDE). As such, the chapter’s first part is concerned with human factors issues in multimedia applications in general, while the second part focus on the field of MDE. Background information is then presented and supported by relevant literature review. The research objectives are presented followed by the general research questions. Finally, this chapter concludes by outlining the thesis structure.

1.2 Background

Over the past few years there have been rapid advances in the field of Information Technology (IT). Evidence is found not only in the literature (e.g. Toffler, 1980; Eason, 1992; Chang & Chen, 1995; and Shackel, 1984) but also in our everyday lives as IT is changing the way people work, communicate and interact with the world. From a historical perspective, there is no doubt that we are in the ‘Information Age’ (Eason, 1992) taking into account the transition from an Industrial Society (The Second Wave) to an Information Society (The Third Wave) (Toffler, 1980). The new era of the ‘Information Superhighway’\(^{1,1}\), clearly conveys the idea that we are undeniably living in an electronic age and people’s livelihoods are unavoidably affected by IT (Chang & Chen, 1995; and Eason, 1997). Nevertheless, Buxton (1994) points out that the notion of being in the middle of an information revolution is false and illustrates a serious lack of understanding of the nature of information. In this sense, Buxton suggests that rather than an information revolution, what we are currently experiencing is a ‘data explosion’. Advances in telecommunications and computational technologies are providing huge quantities of information; however, relevant information is hard to find.

From a socio-economic perspective it is clear that value given to things has altered over recent decades. At one time, wealth and power came mainly to the possessor of material things or to the ruler of military forces capable of conquering the physical means of production: land, labour, and capital. Today, the ascendant nations and corporations are masters not of land and material resources but of ideas and technologies. The electronics industry is the world’s fastest growing major industry. The global network of telecommunications carries more valuable goods than all the world’s super tankers. “Today, wealth comes not to the rulers of slave labour but to the liberators of human creativity, not to the conquerors of land but to the emancipators of mind” (Gilder, 1989; p.17 as cited by McCann, 1995). Finally, ideas, knowledge and creativity are becoming more valuable since IT has provided the means of dealing with communication and information. Nickerson and Landauer (1997) highlight that what is being called the ‘Information Age’, “is expected to be characterized by a decreasing emphasis on heavy industry, mass production, and long-term stability of processes and products and an increasing dependence on flexible small-lot manufacturing, a greater emphasis on services, and growing recognition of information as a major commodity” (p.10).

A further perspective would look at the technology itself and the way the nature of the technology is changing. Since the new technology, specially IT systems, are becoming more electronic rather than mechanical, we are dealing with information retrieval and processing which leads to a cognitive rather than a physical interaction. In this case, multimedia systems have multimodal interfaces which enable multi-channel communication by providing

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1.1 The ‘Information Highway’ is a term that denotes the high speed communication line.
information in different ways. The current study will present an investigation into how technology is affecting learning and teaching processes from a human factors perspective.

1.2.1 Organization-Technology Interaction (OTI)

Over the last couple of decades, a new focus of ergonomics has been emerging. This focus is called 'Organization-Machine Interfaces' and thus is concerned with ergonomics at the 'Macroergonomic' level. Hendrick (1986) pointed out that 'Macroergonomics' represents a top-down approach to system design based on a socio-technical system perspective. It seems to be clear now that the trend has changed from an individual to an organizational focus so the term 'Organization-Machine Interface Technology' first introduced by Hendrick (1986) seems to be more appropriate than Human-Computer Interaction (HCI) because it describes more accurately the new approach. On the other hand, the term 'Organization or even Environment' seems to be even more appropriate because of its close relationship with the organization as an open system, according to the socio-technical perspective. Organizations are viewed as open because they have permeable boundaries exposed to the environment in which they exist.

"Organizations bring two major socio-technical system components (...): technology in the form of a technological subsystem and people in the form of what, in ergonomics parlance, is known as a personnel subsystem. The design of the technical subsystem defines the tasks to be performed. The design of the personnel subsystem prescribes the ways in which the tasks are performed. These two subsystems interact with one another at every human-machine interface."

(Hendrick, 1986; p.471)

1.2.2 Multimedia and (HCI) in the context of ergonomics

In order to understand the scope of this research, a classification of ergonomics by Hendrick (1986) is presented. Hendrick (1986) has classified ergonomics into three generations:

- First generation: 'Human-Machine Technology'
  - Workstation design - dimensions, layout, etc.
  - Knowledge from anthropometry, physiology, etc.
  - Relationship between the worker and their workplace - machines, furniture, products
  - Man-machine design

- Second generation: 'User-Interface Technology'
  - Human-computer interaction and user interface design
  - Screen design, screen layout, icons, etc.
  - Knowledge from cognitive psychology

- Third generation: 'Macroergonomics'
  - Human factors in organizational design and management
  - Socio-technical system level
  - Organization-machine interface technology

It has been noted, however, that the first two generations of ergonomics focused on the individual workstation or microergonomic aspects of systems. With increasing developments of new technology for automating factories, there has also been increasing awareness of the impacts of IT on organizations (Eason, 1988; and Eason, 1997). It is worth pointing out that cognitive and organizational aspects of the interaction between the MDE technology and the stakeholders will be taken into consideration rather than the physiological and biomechanic ones. In the next section, the terms multimedia, hypermedia and hypertext are defined.

1.2.3 Defining multimedia, hypermedia and hypertext

According to ISO 14915, the term Multimedia "refers to combinations of static and/or dynamic media which can be interactively controlled and simultaneously presented in an appropriate system. Examples are combinations of text and video, or audio and graphical animation" (ISO 14915, draft unpublished; p.4). Over the past decade it has been seen that the concept of multimedia has been generating confusion. England (1994) argues that multimedia can be seen from different perspectives: firstly from the user's perspective which refers to the different
sensory and operating modalities that a user brings to bear in receiving and communicating information to a
machine; secondly from a systems-oriented approach which is the most common so far (e.g. Steinmetz & Nahrstedt,
1995; Georganas, 1997; and Blattner & Dannenberg, 1992). Despite not having a standard definition of multimedia
yet, Georganas (1997) considers multimedia as being any application that involves, at least, one time-varying
(continuous or dependent) media, such as video, audio and, at least, one static such as text, image or graphics as a
means of interaction between the machine (computer) and humans (e.g. users). Moreover, Waterworth and Chignell
(1997) point out that multimedia “involves computer-assisted interactive presentations in more than one sensory
modality” (p.916). Nevertheless, Steinmetz and Nahrstedt (1995) argue that there are two controversial definitions.
The first way of defining it is quantitative, “a multimedia system is any system which supports more than a single
kind of media” (p.14). This characterization is insufficient due to the fact that it only deals with a quantitative
evaluation of the system. According to this narrow definition, each system processing text and graphics would be
classified as a multimedia system. “Hence, the notion multimedia implies a new quality in a computer environment”
(p.15). The second way is that multimedia can be understood more in a qualitative rather than a quantitative way.
“Therefore, the kind rather than the number of supported media should determine if a system is a multimedia
system” (p.15).

Furthermore, Blattner and Dannenberg (1992) suggested that the term ‘medium’ refers to the way by which
the information is carried (e.g. printed paper is a medium). Other media include video, audio and bit-mapped
computer display terminals. According to Blattner and Dannenberg (1992) “a multimedia computer system is one
that is capable of the input or output of more than one medium. Typically, the term is applied to systems that support
more than one physical output medium, such as computer display, video and audio” (p. xxiii). Hypertext is an
information management system that stores data as a network of chunks of information called nodes (Conklin, 1987;
Smith & Weiss, 1988 as cited by Pfeiffer & Eberleh, 1991). A hypertext system consists of nodes of information
connected together by links. The fact that nodes are interconnected in the hyper-space provides a non-linear
structure which is the main feature of hypertexts. In contrast to predefined data structure, this feature provides
freedom for the user. As a result, users can get lost in the hyper-space if proper navigational aids are not provided.
Finally, when a hypertext system has multimedia capabilities, it is normally referred to as being a hypermedia system
and the other way round, when a multimedia system has a net of nodes structure, it is normally referred to as being a
hypermedia system (see figure 1.1).

Figure 1.1: The multimedia, hypermedia and hypertext relationship
(from Steinmetz & Nahrstedt, 1995; p.490).

In order to narrow this broad arena, this research will focus on a particular kind of multimedia application:
Distance Education (DE). The next sections outline a taxonomy of multimedia applications as a preliminary step
towards understanding it. Finally, the human factors issues encountered in each application are also presented.

1.3 Taxonomy of the human issues in multimedia applications

Originally, the term taxonomy was understood as the classification science of laws of life forms. In other
words, "taxonomy means the science of classification in general and any specific classification respecting its rules"
(Landsheere, 1997; p.803). However, taxonomy related to the social and human sciences cannot have the rigor or the
perfect branching structure of the hierarchical taxonomy in the natural sciences (Landsheere, 1997). This chapter
presents the development of a taxonomy of the multimedia applications. As a result, a taxonomy of the human issues
encountered in each application is also developed and presented.
1.3.1 The development of a taxonomy of the multimedia applications

This section outlines some of the most common multimedia applications which could be classified into six different categories: (1) Education and Training; (2) Word Wide Web/Hypermedia and Information Retrieval; (3) Kiosk; (4) Computer Supported Co-operative Work, (4.1) Teleconferencing, (4.2) Telemedicine; (5) Catalogue and (6) Virtual Reality. Further applications could also be suggested, e.g. Decision Support Systems/Expert Systems and Entertainment/Leisure; however, only the most relevant ones to the current research are described.

In order to have a better understanding of the scope of multimedia systems and their interaction with people and organizations, the most common applications of multimedia interfaces have been classified. There are different ways of classifying multimedia applications in general, and Web sites (Shneiderman, 1997) and Hypertext applications (Nielsen, 1995) in particular. Since these two particular cases use a multimedia interface, it is important to take their examples into consideration. The next paragraphs present the way these two authors have classified Web sites and Hypertext applications. Shneiderman (1997) classified Web site applications in four categories. However, taxonomies of Web sites from many perspectives are likely. The first category is to consider the originator’s identity: individual, group, university, corporation, non-profit organization, or government agency. The second category is the number of Web pages or amount of information that is accessible: “one-page bios and project summaries are small, organization overviews for internal and external use are medium, and airline schedules and the yellow pages are large” (Shneiderman, 1997). The third way of categorization is by goals of the originators, as interpreted by designers of Web sites. These goals might be: “to sell products, advertise products, inform and announce, provide access, offer services, create discussions, nurture communities” (Shneiderman, 1997; Web site). The fourth way of categorizing is by measures of success. For instance, for many corporate Web sites the publicity is measured in number of visits. For others, the value is directly in promoting sales of products such as movies, books, events or automobiles. Finally, for access providers who earn fees from hourly usage charges, success is measured by thousands of hours of usage per week. According to Shneiderman, other measures include diversity of access as defined by the number of users or their countries of origin, or whether the users came from university, commercial or others domains.

Another perspective, which categorizes hypertext applications, is suggested by Nielsen (1995). He has classified hypertext applications into five categories: computer applications, business applications, intellectual applications, educational applications, and entertainment and leisure applications. Each of them has been divided into other subcategories:

- Computer applications include: on-line documentation; user assistance; software engineering and operating systems;
- Business applications include: manuals; dictionaries; auditing; law; trade shows, products catalogues and advertising;
- Intellectual applications include: idea organization and brainstorming support; journalism; research;
- Educational applications include: foreign languages; classics; museums;
- Entertainment and leisure applications include: tourist guides; libraries; interactive fiction; news, newspapers and magazines.

Since multimedia interfaces have been used in several contexts it is suggested that multimedia applications be classified in accordance with their context of use. However, it has been noted that there are clear overlaps and synergy among the applications. For instance, a training system which stores information about a particular subject is not only a training system itself but also an information retrieval system that could be delivered by the World Wide Web. In the case of telemedicine, depending on the context, it can be used through teleconferencing. Therefore, teleconferencing could be included in the area of Computer Supported Co-operative Work (CSCW) since the users use it as a means to establish the work that could not be possible when there are geographic barriers.

Finally, Vora and Helander (1997) believe “that hypertext as a separate technology will cease to exist. Hypertext will become so integrated with other technologies - or may be the other way round - that ‘hypertext’ will become the way to interact with information on computers” (p.908). One of the approaches used to identify what the issues are in each multimedia application was to investigate what the advantages and disadvantages of using such applications are. There are many advantages and disadvantages of multimedia applications, however, the most relevant ones, from the human point of view, are described in the next sections.
Education / Training

In the late 80's, Computer-Based Training (CBT), Computer-Assisted Learning (CAL) and Computer-Assisted Instructions (CAI) applications were in their infancy. However, Eberts and Brock (1988) reported that “of 54 studies examined, 37 found that students using CAI scored better on exams; 17 studies found that conventional instruction was better” (p.604). Examples of CBT, CAL and CAI applications include: integrated learning, encyclopaedias and archives (CD-ROMs), simulation, and distance learning systems.

Table 1.1: Advantages and disadvantages of Education/Training via multimedia

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flexibility (Chang &amp; Chen, 1995);</td>
<td>• Increasing training demands by teachers,</td>
</tr>
<tr>
<td>• Quick access in providing feedback (Chang &amp; Chen, 1995);</td>
<td>lecturers and professors due to the change of their roles in teaching activity</td>
</tr>
<tr>
<td>• Just-in-time learning, that allows users to learn what they need when</td>
<td>into explorer, content specialist, learning specialist and</td>
</tr>
<tr>
<td>they need, and where they need it;</td>
<td>resource expert (Chang &amp; Chen, 1995);</td>
</tr>
<tr>
<td>• Education accessed by off-campus students and even students from outside</td>
<td>• A poorly designed instruction system will not</td>
</tr>
<tr>
<td>of the country (Chang &amp; Chen, 1995);</td>
<td>improve learning;</td>
</tr>
<tr>
<td>• Creative and motivational learning environment (Chang &amp; Chen, 1995);</td>
<td>• It was reported that “tutors had spent more time preparing classes by</td>
</tr>
<tr>
<td>• Ability to cross geographical barriers (Chang &amp; Chen, 1995);</td>
<td>video conferencing and, mindful of the difficulties of students</td>
</tr>
<tr>
<td>• Make learning more interesting, effective and efficient (Chang &amp; Chen,</td>
<td>concentrating for long periods when the tutor is not physically present,</td>
</tr>
<tr>
<td>1995);</td>
<td>had reduced rather than increased the time they spent in lectures”</td>
</tr>
<tr>
<td>• Accessibility is the main advantage of Distance Learning using the Web;</td>
<td>(Abbot et al., 1993; Web site);</td>
</tr>
<tr>
<td>• “Distance learning should permit not only the retrieval of multimedia</td>
<td>• The use of video conferencing in Distance Learning applications requires a</td>
</tr>
<tr>
<td>documents from distant databases or digital libraries but also allow</td>
<td>special wide angle lens in order to include an entire class</td>
</tr>
<tr>
<td>opening up real-time conferencing connections and teleconsultation or</td>
<td>in one view (Kies, Williges &amp; Williges, 1997);</td>
</tr>
<tr>
<td>collaborative work among participants, with shared multimedia applications</td>
<td>• “The lecturer may have difficulty discerning the remote group and scanning</td>
</tr>
<tr>
<td>white boards” (Georganas, 1997; p.327);</td>
<td>for details such as raised hands or inattentive participants” (Kies, Williges</td>
</tr>
<tr>
<td>• “The advantages of CAI can be evaluated also in terms of cost per</td>
<td>&amp; Williges, 1997; p.994).</td>
</tr>
<tr>
<td>contact hour and a reduction in instructional time due to</td>
<td></td>
</tr>
<tr>
<td>individualization” (Eberts &amp; Brock, 1988; p.604);</td>
<td></td>
</tr>
<tr>
<td>• “CAL applications, due to individualised instruction, can reduce the</td>
<td></td>
</tr>
<tr>
<td>instruction time, which, in turn, reduces cost” (Eberts &amp; Brock, 1988;</td>
<td></td>
</tr>
<tr>
<td>p.604);</td>
<td></td>
</tr>
<tr>
<td>• CAI can allow a reduction in the number of instructional</td>
<td></td>
</tr>
<tr>
<td>administrative and training support staff” (Eberts &amp; Brock, 1988; p.604);</td>
<td></td>
</tr>
<tr>
<td>• “CAI can reduce travel time” (Eberts &amp; Brock, 1988; p.604);</td>
<td></td>
</tr>
<tr>
<td>• “CAI can provide rapid update of material. It is generally more</td>
<td></td>
</tr>
<tr>
<td>difficult and expensive to change printed material than to make</td>
<td></td>
</tr>
<tr>
<td>minor changes to the courseware” (Eberts &amp; Brock, 1988; p.604).</td>
<td></td>
</tr>
</tbody>
</table>

World Wide Web (WWW) / Hypermedia / Information Retrieval

What characterizes this form of multimedia application, is the way information is structured (e.g. Hypertext). This area of applications includes: home pages, CD-ROMs, kiosks, electronic libraries, on-line publications (e.g. journals), and databases.

Table 1.2: Advantages and disadvantages of WWW/Hypermedia/Information retrieval via multimedia

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• &quot;New ways of information organization promote new forms of</td>
<td>• Non-linear information structures do not mirror the way</td>
</tr>
<tr>
<td>knowledge” (Waterworth &amp; Chignell, 1997; p.917);</td>
<td>information is organized in the human mind indicating that any</td>
</tr>
<tr>
<td>• The non-linear structure can be created allowing information to</td>
<td>advantages of associative chunking of information in hypermedia</td>
</tr>
<tr>
<td>be explored through a variety of routes;</td>
<td>cannot be attributed to some structural isomorphism with human</td>
</tr>
<tr>
<td>• The routes can be tailored to the needs of individual ‘readers’;</td>
<td>cognition (Waterworth &amp; Chignell, 1997; p.919);</td>
</tr>
<tr>
<td>• Users can get lost in the information space if some form of navigational</td>
<td>• Users can get lost in the information space if some form of navigational</td>
</tr>
<tr>
<td>aid is not provided.</td>
<td>aid is not provided.</td>
</tr>
</tbody>
</table>
Kiosk

Examples of applications in this area include: galleries, museums, banks, railway stations, airports, and shopping centres.

Table 1.3: Advantages and disadvantages of kiosk via multimedia

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To provide information where it is needed (i.e., galleries, museums, railway stations, airports and shopping centres) since it is located in strategic places;</td>
<td>• In the case of museums and art galleries, to see the original Mona Lisa 'face-to-face' is not the same as seeing it on the screen (Nielsen, 1995);</td>
</tr>
<tr>
<td>• Can encourage visitors (galleries, museums) or tourists (railway stations, airports) to explore the information net by themselves;</td>
<td>• Traditional tourist information kiosks need to be structured on a single principle, whereas the tourist has multiple varying needs (Nielsen, 1995);</td>
</tr>
<tr>
<td>• Can provide more information than would be found in a typical poster or brochure (Nielsen, 1995);</td>
<td>• Tourist information kiosks should be usable by visitors from foreign countries, who may not speak the local language;</td>
</tr>
<tr>
<td>• If well designed, can provide the most suitable information in many different languages since the tourists may not speak the local language and are unable to communicate to the information desk attendant (Nielsen, 1995).</td>
<td>• Because the mouse is too fragile to use in this context, it is common to use a touch screen as the pointing device instead. Touch screens require the use of arm(s) which are not practical for tourists carrying suitcases (Nielsen, 1995);</td>
</tr>
<tr>
<td></td>
<td>• Touch screens also require a more robust screen layout with large buttons considering the size of the fingers.</td>
</tr>
<tr>
<td></td>
<td>• The delay in processing information and updating screens may cause distractions or even abandonment of the system by users.</td>
</tr>
</tbody>
</table>

Computer Supported Co-operative Work (CSCW)

"Computer supported co-operative work is the melding of communications and computer technology to support work in groups of varying size, permanence, and structure (...) the tools can support groups that are face-to-face or distributed, working together at the same time or working asynchronously, and working within a variety of organizational contexts" (Olson, Olson & Kraut, 1992; p.251). According to Olson, Olson and Kraut (1992), the area of CSCW has grown to include networking, interoperability and multimedia. Under this section, teleconferencing and telemedicine are described.

- Teleconferencing

Video/Audio Conferencing:

"Multimedia Teleconferencing is a combination of technology and applications that allow multiple users in multiple locations to interactively share data, desktop applications, and live video simultaneously" (IMTC - International Multimedia Teleconferencing Consortium, Web site). Teleconferencing has been used as a means of carrying out 'distance education' among other things. "The term 'distance education' refers to teaching and learning situations in which the instructor and the learner or learners are geographically separated and therefore rely on electronic devices and print materials for instructional delivery" (Keegan, 1983; Holmberg, 1981; as cited by Abbott et al., 1993; Web site). In an electronic office context, "desktop video conferencing, like many other new forms of computer-mediated communication, is fundamentally altering the structure of white-collar tasks, changing traditional works relationships, and challenging the organizational structure of today's work environments" (Kies, Williges & Williges, 1997; p.980).
Table 1.4: Advantages and disadvantages of video/audio conferencing via multimedia

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- “Typical local computer supported meeting environments offer each participant a personal computer linked to an electronic white board shared by all participants” (Preece et al., 1994; p.341);</td>
<td>- People feel uncomfortable being in front of the camera (Abbott et al., 1993);</td>
</tr>
<tr>
<td>- “Remote shared workspaces typically offer a multimedia electronic workspace where each member can see simultaneously the drawing and writing of other group members on a shared work surface, can talk to, and sometimes can see images of other members” (Preece et al., 1994; p.341);</td>
<td>- Students reported “being unhappy with audioconferencing: they had become accustomed to the visual quality of videoconferencing and for them audioconferencing was a ‘step back’ rather than a move forward in the application of teleconferencing” (Abbott et al., 1993; Web site);</td>
</tr>
<tr>
<td>- Saves money (Kies, Williges &amp; Williges, 1997; p.979);</td>
<td>- The physical environment requires special consideration due to the sensitive nature of networked multimedia communications” (Kies, Williges &amp; Williges, 1997; p.981);</td>
</tr>
<tr>
<td>- Saves time (Kies, Williges &amp; Williges, 1997; p.979);</td>
<td>- “The audio channel is most critical to successful communication” (Kies, Williges &amp; Williges, 1997; p.984);</td>
</tr>
<tr>
<td>- Avoids travel (Kies, Williges &amp; Williges, 1997; p.979);</td>
<td>- “Videoconferencing sessions may degrade communication due to poorly transmitted visual cues” (Kies, Williges &amp; Williges, 1997; p.986);</td>
</tr>
<tr>
<td>- Enriches interpersonal communication (Kies, Williges &amp; Williges, 1997; p.979);</td>
<td>- “To overcome eye contact problems, participants may be instructed to look at the camera when speaking” (Kies, Williges &amp; Williges, 1997; p.990);</td>
</tr>
<tr>
<td>- “Video has the greatest potential to simulate a face-to-face meeting between remotely located participants” (Kies, Williges &amp; Williges, 1997; p.980);</td>
<td>- “The success of some computer-supported group activities such as brainstorming and decision-making are contingent upon the responsiveness of the system. Because of their high processing overhead and tendency to clog networks, video connections may serve to create detrimental lags in activities requiring a high degree of synchrony” (Ellis, Gibbs &amp; Rein, 1991 as cited by Kies, Williges &amp; Williges, 1997; p.996).</td>
</tr>
<tr>
<td>- “Video offers a restricted field-of-view on remote sites which limits the normal ability to perceive scenery in the periphery. This limitation can include obstruction of a shared workspace, other participants, or simply contextual information about the remote location. These restrictions require the user to become accustomed to limited field-of-view, but could also create advantages not found in face-to-face settings, such as the ability to do multiple tasks or hold side conversations without appearing impolite” (Kies, Williges &amp; Williges, 1997; p.986);</td>
<td></td>
</tr>
<tr>
<td>- Videoconferencing systems attempt to transmit gestures and facial expressions to create a richer communication session (Kies, Williges &amp; Williges, 1997; p.986);</td>
<td></td>
</tr>
<tr>
<td>- Offers the ability to determine whether or not others can see you.</td>
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</tbody>
</table>

### Telemedicine

According to Wyden (1995) the term Telemedicine means the use of IT in order to support distance medical tasks by physicians or dentists. Telemedicine is a diverse collection of technologies and clinical applications. Multimedia technology for the transmission of sound and images has witnessed revolutionary change, so too have medical technologies. These advances in telecommunications and medicine have made advanced medical care available where not thought possible before (Wyden, 1995).

Table 1.5: Advantages and disadvantages of telemedicine via multimedia

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- “Telemedicine has been used effectively to improve public health in rural communities by providing timely information and training for rural county health departments” (The Western Governors’ Association Telemedicine Action Report, Web page);</td>
<td>- There is concern about malpractice liability associated with telemedicine and about the confidentiality of patient’s information (Wyden, 1995);</td>
</tr>
<tr>
<td>- Telemedicine enables all citizens, including the rural communities, to immediately access the appropriate level of medical care;</td>
<td>- There is concern about allocation of responsibilities for medical care (Eason, Harker &amp; Olphert, 1996);</td>
</tr>
<tr>
<td>- Links to local primary care facilities will enable many patients to remain in loco under the responsibilities of physicians or dentists (Wyden, 1995);</td>
<td>- No guarantee that the patient will follow the advice of the specialist (Eason, Harker &amp; Olphert, 1996);</td>
</tr>
<tr>
<td>- Links to care centres can reduce the cost of transport and can lead to substantial reductions in the costs of patient care (Wyden, 1995);</td>
<td>- It “is severely hampered by legal impediments of which licensure is one of the most obvious” (Wyden, 1995; Web site).</td>
</tr>
<tr>
<td>- Provides expertise in accordance with demands for combating injury or illness wherever and whenever they may occur;</td>
<td></td>
</tr>
<tr>
<td>- Enables more patients to be treated in the community with a saving on hospital time and resources and savings in transport costs (Eason, Harker &amp; Olphert, 1996);</td>
<td></td>
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<tr>
<td>- “Continuing education and consultations via telemedicine are expected to improve recruitment and retention of health professionals in rural areas, many of which would otherwise be without any local medical care” (The Western Governors’ Association Telemedicine Action Report, Web site).</td>
<td></td>
</tr>
</tbody>
</table>

7
Catalogue

Examples of applications in this area include: on-line catalogues and on-line or Web shopping.

Table 1.6: Advantages and disadvantages of catalogue via multimedia

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides not only access to large amounts of information but also, to show the consumer only those small parts of interest;</td>
<td>Customers’ mail boxes can be overloaded by receiving undesired adverts which is considered unethical;</td>
</tr>
<tr>
<td>It can also, offer help in placing the order and might even place it by an on-line connection to the vendor;</td>
<td>Customers are still afraid of shopping through the Web when they are asked to submit their credit card numbers even when they know beforehand that those numbers are automatically encrypted and protected.</td>
</tr>
<tr>
<td>Provides an option to remember what products the consumer ordered the previous time;</td>
<td></td>
</tr>
<tr>
<td>Includes strategies to attract attention from the customer</td>
<td></td>
</tr>
<tr>
<td>(e.g. driving simulations, games and the possibility to chose the colour of the car), in the case of a car catalogue (Nielsen, 1995);</td>
<td></td>
</tr>
<tr>
<td>The traditional way of shopping has been considered boring while on-line shopping can be done at home (Nielsen, 1995).</td>
<td></td>
</tr>
</tbody>
</table>

Virtual Reality

Kalawsky (1993) suggests seven main application areas: scientific visualization and interaction, training (simulators), engineering design and manufacture (rapid prototyping), medical (mainly training - visual corpses), aerospace, architectural planning, and operations in hazardous environments.

According to Kalawsky (1993) there are many definitions of Virtual Reality (VR). “VR is the state where the level of interaction, autonomy and feeling of presence is indistinguishable from the real world. Unfortunately we are a long way from achieving really good VR today because of technology limitations and lack of human factors understanding” (Kalawsky, 1993; p.343). Vora and Helander (1997) envisaged an optimistic future for Virtual and Hypertext environments. In the future, linked and retrieval of information will be based not only on text or simple graphics, but will also use images, sound, and video (p.907).

Table 1.7: Advantages and disadvantages of virtual reality

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual environments provide the most natural means of communicating with computers (Kalawsky, 1993; p.14);</td>
<td>“VR displays should respond to changes in tracked objects especially the user’s head, at least ten times per second for the Virtual Environment to be convincing” (Foxlin &amp; Durlach, 1994 as cited by Steinmetz &amp; Nahrstedt, 1995; p.757);</td>
</tr>
<tr>
<td>“VR provide a wide field of regard visual/auditory portrayal medium that can present information to an operator wherever he/she looks” (Kalawsky, 1993; p.14);</td>
<td>“A phase lag in the tracker system can lead to unacceptable lags in the visuals presented to the user. This leads to a symptom known as simulator sickness” (Kalawsky, 1993; p.206);</td>
</tr>
<tr>
<td>“Correct use of auditory displays can greatly enhance the operator’s ability to deal with complex situations where considerable amounts of information have to be processed” (Kalawsky, 1993; p.15);</td>
<td>“Optimization of the Visually Coupled System (VCS) illusion can only be achieved if the performance of the technology is matched to the human perceptual system, a system that has evolved to perceive the natural environment. Failure to match the requirements of the perceptual system may appear as flaws in the illusion of a virtual environment” (Kalawsky, 1993; p.211);</td>
</tr>
<tr>
<td>“Some tasks would benefit from the provision of an immersive environment where cues from the outside world could affect the operator” (Kalawsky, 1993; p.15);</td>
<td>“To create a perceptually rich virtual environment illusion, we must understand the performance requirements of the human perceptual system” (Kalawsky, 1993; p.211).</td>
</tr>
<tr>
<td>“Some virtual environment systems can present information where structural supports would prevent information being displayed” (Kalawsky, 1993; p.15).</td>
<td></td>
</tr>
</tbody>
</table>


1.3.2 Overview of the human issues identified in each multimedia application

Once the advantages and disadvantages of each multimedia application have been investigated through a literature review, the human issues can be identified. Furthermore, it is worth mentioning that the human issue does not cover the technical ones but it covers the issues directly associated with people who use or are affected by the application. These issues include: (1) organizational, (2) biomechanics, (3) psychophysiological, (4) cognitive, (5) environmental, and (6) legal. Hence, the taxonomy of the human issues is suggested, see figure 1.2.

![Figure 1.2: Taxonomy of the human issues](image)

In this thesis, the shaded areas shown in this figure (1.2), will be taken into account. Many human issues have been identified and the next table (1.8) provides the taxonomy of the most relevant ones.
Table 1.8: Taxonomy of the human issues in multimedia applications

<table>
<thead>
<tr>
<th>Multimedia applications</th>
<th>Examples of human issues include:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Education/ Training</strong></td>
<td>Tutors, lecturers and professors have their respective roles changed with the implementation of new technologies for teaching and learning through multimedia applications at a distance; (Organizational issue) More time needs to be spent on preparing materials for teaching; (Organizational issue)</td>
</tr>
<tr>
<td><strong>2. WWW/ Hypermedia/ Information Retrieval</strong></td>
<td>Navigational aids, browsers and landmarks must be provided considering users’ needs in terms of their tasks and information required. Users can get lost if some form of navigational aid is not provided; (Cognitive issue)</td>
</tr>
<tr>
<td><strong>3. Kiosk</strong></td>
<td>The delay in processing information and updating screens may cause distractions or even the abandonment of the system by users; (Cognitive issue)</td>
</tr>
<tr>
<td><strong>4. CSCW 4.1 Teleconferencing</strong></td>
<td>The importance of gesture and eye contact in videoconferencing sessions (Kies, Williges &amp; Williges, 1997; p.981); (Cognitive issue) The affordability of infrastructure for video communication; (Organizational issue) Privacy concerns; (Organizational issue) “Self-view is critical to user satisfaction and acceptance” (Kies, Williges &amp; Williges; 1997; p.991); (Psychophysiological issue) There are lags in activities which require a high degree of synchrony (Ellis, Gibbs &amp; Rein, 1991 as cited by Kies, Williges &amp; Williges, 1997); (Cognitive issue)</td>
</tr>
<tr>
<td><strong>4. CSCW 4.2 Telemedicine</strong></td>
<td>Licence for practitioners of telemedicine; (Legal issue) Concerns about malpractice liability (Wyden, 1995); (Organizational and legal issue) Concerns about confidentiality of patient’s information; (Legal issue) Concerns about allocation of responsibilities for medical care (Eason, Harker &amp; Olphert, 1996); (Organizational issue) No guarantee that the patient will follow the advice of the specialist (Eason, Harker &amp; Olphert, 1996); (Organizational issue)</td>
</tr>
<tr>
<td><strong>5. Catalogue</strong></td>
<td>Customer’ mail boxes can be overloaded by receiving undesired adverts which is considered unethical; (Legal issue) Customers are still afraid of shopping through the Web when they are asked to submit their credit card number even when they know beforehand that the numbers are automatically encrypted and protected; (Legal issue)</td>
</tr>
<tr>
<td><strong>6. Virtual Reality (VR)</strong></td>
<td>Serious perceptual conflicts (lags) between the VR responses and the human perceptual system may cause simulated sickness (Kalawsky, 1993; p. 211); (Cognitive issue).</td>
</tr>
</tbody>
</table>

The shaded row indicates the main area of concern and which this thesis will focus in the subsequent sections. After identifying the human issues in each multimedia application it was noticed that there are clear overlaps between the issues themselves. For example, what is considered a legal issue could also be classified as an organizational issue. Despite not being the purpose of this chapter, there are two issues that must be highlighted, costs and human resources. For instance, in the field of education, governments may be seeking to reduce the amount of money they put into education; on the other hand institutions are increasingly looking for sources of funding other than those derived from government. Furthermore, human resources are still scarce, since not every member of staff has learned how to design and produce computer-based materials (CBM) for teaching. Therefore the development process is time-consuming. This leads to a situation where the process of making decisions about whether or not to implement new technologies for teaching becomes critical. The cost of distance education (DE) is still a concern for the ones who are responsible for its implementation. This risky situation also applies to other kinds of multimedia applications, whenever the use of new technologies is involved. The review of scarce but relevant literature and the
development of a taxonomy for multimedia applications presented in this chapter have proven to be a useful way of identifying the human issues in each of these applications. Nevertheless, further research including field studies is needed to develop this arena. Hence, part III of this thesis describes a series of field studies carried out in the context of use of Multimedia Distance Education (MDE).

Educational technology is changing rapidly. As a result, the way lecturers and students teach and learn are being affected by these educational technologies. Other members of the stakeholders' community such as technicians, co-ordinators and sponsors are also affected. This research investigates the way multimedia distance education can be studied from a human factors/ergonomics perspective. Normally, research into the evaluation of a distance education programme consists of measurements of students' scores or comparisons with traditional (face-to-face) education. These views are already a well-established domain of research of practitioners and researchers from the educational field. However, more research remains to be conducted to investigate this phenomenon considering the subjective human factors such as feelings, expectations, desires, fears, difficulties and issues when performing two major activities, teaching and learning via multimedia technologies at a distance. As an attempt to develop an appropriate framework, a series of case studies was carried out, but before presenting this, it is important to clarify the field of DE. The next sections aim at presenting some of the different approaches and concepts of distance education (DE).

1.4 Origins of distance education

What is called distance learning today has its origins in teaching and learning by correspondence. Correspondence education has been part of adult education for several generations. Correspondence education denotes learning by means of so called self-instruction texts, i.e. correspondence between students and tutors. However, the term correspondence education was felt by many to be too narrow (Holmberg, 1989). As a result, two terms have been used as competing terms in North America, independent study and home study. The same applied to external study in Australia and New Zealand. Since the early 1970s, distance education is the designation that has gradually been adopted in the United Kingdom (Holmberg, 1989; p.1). In 1982, the term distance education (DE) was formally recognized when the International Council for Correspondence Education (ICCE) changed its name to the International Council for Distance Education.

1.4.1 The lack of consensus

According to Holmberg (1989), the British Open University (UKOU) and other institutions that adopt the adjective “open” play a major role in what is called distance education. The adjective “open” does not necessarily mean distance education; in fact it does not have anything to do with distance education.

"As distance education refers mainly to mode of delivery, open education refers to structural changes. A distance education institution can also be an open institution but not necessarily so. Open education refers to structural changes so as to make an institution open: open with respect to place; time; content of learning; mode of learning etc.”

(Dewal, 1986; p.8 as cited by Holmberg, 1989)

This approach contradicts the statement by Lewis and Spencer (1986, p.17) that distance learning is a sub-category of open learning, due to the frequent use of some features of ‘distance learning’ in ‘open learning’. Another view, by Thorpe (1987, p.56) is that ‘correspondence education as a term has been overtaken by ‘distance education, which, in the United Kingdom at least, has in turn been overtaken by ‘open learning’. There are many approaches to the concepts of DE. These approaches vary due to the lack of a clear consensus amongst the different concepts. The approaches can vary in terms of the way the process of learning/teaching is being delivered as well as the technology that is being applied in order to support this process. The vagueness of the term ‘open’ makes it acceptable to common usage.

Despite the lack of consensus, we prefer to adopt the approach that open learning is not synonymous with DE, nor is DE a sub-set of open learning. Furthermore, the term ALN (Asynchronous Learning Network) which has been popularly used in the US, is believed to be a sub-set of DE as shown by figure 1.5. "Because DE aims to provide instruction in places and times that are convenient for learners rather than teachers or teaching institutions, many people use the term ‘distance learning’ as a synonym for DE. We understand that this is not strictly accurate, since in education our interest is in learning that is deliberate and planned, and therefore with teaching as well as
learning, nevertheless, when we cite authors who use the term 'distance learning', we will use it also" (Moore & Kearsley, 1996; p.2).

Keegan (1986) has analysed carefully a variety of different definitions available in the appropriate literature. According to Rumble (1986; p.10) "perhaps the most comprehensive general definition of DE is that first proposed by Keegan in 1980 and subsequently modified in 1986". Keegan’s definition is based on an analysis of definitions proposed by Holmberg (1977), Peters (1973), and Moore (1973). Keegan, therefore, has concluded six basic defining elements of DE (Keegan, 1986; p.42):

- The separation of teacher and learner which distinguishes it from face-to-face lecturing;
- The influence of an educational organization which distinguishes it from private study;
- The use of technical media;
- The provision of two-way communication so that the student may benefit from or even initiate dialogue;
- The possibility of occasional meetings from both didactic and socialization purposes;
- The participation in an industrialized form of education which, if accepted, contains the genus of radical separation of distance education from other forms within the educational spectrum.

Nevertheless, Moore and Kearsley (1996) discussed the reaction of Garrison and Shale (1987) and Garrison and Baynton (1987) to Keegan’s stipulation that a distinguishing feature of DE was the ‘quasi-permanent absence of the learning group’. Garrison and Shale (1987) agree that DE “implies some form of interaction or dialogue between teacher and taught” (Garrison & Shale, 1987; p.11), and that “technical media are required to mediate this communication”. However, they argue that Keegan’s definition is limiting and only defines “a private print-based form of study and (...) does not adequately consider new generations of technological delivery” (Garrison & Shale, 1987; p.9). “They explained that teleconferencing was, by definition, a group of methods of learning that provide for real-time interaction among all participants in a manner similar to traditional classroom instruction. Yet according to one of Keegan’s original elements, this method could not be considered a form of distance delivery because people are not taught individually” (Moore & Kearsley, 1996; p.207). For further literature on the definitions of DE, see Kaye, 1988; Keegan, 1980; Keegan 1983; Holmberg, 1974; Holmberg, 1977; Holmberg, 1979; Moore, 1973; Moore, 1977a; Moore, 1977b; and Rumble, 1989.

1.4.2 Taxonomy of the different forms of distance education

A taxonomy of the different forms of DE is presented as an attempt to a better structural understanding of the variety of terminology due to the inconsistency about the boundaries of the different concepts of DE. There are many ways of classifying DE. The following sections present categorizations from four different perspectives: (a) organizational, (b) structural, (c) communicational media and (d) applicational.
a) Taxonomy of distance education according to its organization

From an organizational perspective, it is possible to classify education as a whole into two categories: (1) Institutionalized / Educational organization and (2) Non institutional / Non organizational (see figure 1.3).

![Figure 1.3: Taxonomy of DE according to its organization.](image)

b) Taxonomy of distance education according to its structure

Secondly, it is possible to categorize education as a whole from a structural perspective in which education is divided into two categories: (1) direct education and (2) indirect education. Distance education (DE) is one of the subcategories of indirect education. There is one basic distinction between the two subcategories of indirect education that is the lack of an organizational didactical structure. Therefore this distinction originated this second way of categorization, see figure 1.4.

![Figure 1.4: Taxonomy of DE according to its structure](image)


c) Taxonomy of distance education according to its means of communication

The third way of categorizing DE is by its communication media: (1) print based, (2) audio based, (3) video based, and (4) computer based. Figure 1.5 shows the subcategories under these four means of communication. It is worth noting that the categories under "course content via the Internet" are distinguished by their characteristics regarding the asynchronous or synchronous way of communication or course content delivery.
d) Taxonomy of distance education according to its areas and levels of applications

Finally, the fourth way of categorization shows DE and its subcategories according to its areas and levels of application as well as the distinctions among them, see figure 1.6.

Figure 1.6: Taxonomy of DE according to its areas and levels of applications.

Finally, the diversity of approaches, definitions, terms and therefore taxonomies appear to be an endless process. New technologies in general and information technologies (IT) in particular are constantly changing due to
its advanced progress towards new developments that provide a variety of new opportunities. As a result, there will always be different taxonomies to be developed for this huge arena that is distance education (DE).

1.5 Models of distance education

There have been some attempts made to categorize DE into models. The literature reviewed suggests that the most significant ones for the purpose of this thesis were: The University of Maryland University College has developed studies for the University system of Maryland Institute for Distance Education (IDE). The IDE’s (1997) study describes three models of DE: (1) Model A refers to distributed classroom, (2) Model B refers to independent learning, and (3) Model C refers to a combination of open learning and traditional classroom teaching. The models differ from one another in their characteristics, faculty role/experience, on-site students’ experience, distant students’ experience, technologies for support of class sessions, technologies for support out-of-class communication, opportunities for interaction, and support services needed. For more detail see http://www.umuc.edu/ide/modlmanu.html; and the systems model by (Kaye & Rumble, 1981; and Moore & Kearsley, 1996).

It is also agreed that “a systems approach is helpful in planning DE” (Perraton, 1981; p. 21; Moore & Kearsley, 1996; and Kaye & Rumble, 1981). Although the systems model by Kaye and Rumble tends to stress the ‘rational’ aspects of management, the systems model by Moore and Kearsley, in contrast, tends to emphasize the human relation aspects of management. Saba (1999d) adds that:

“ Ironically, delivery systems do not present the major impediment to DE planning and implementing, while a disproportionate amount of time is spent on the issue. In parallel to the question of technology or delivery, several other questions should be addressed. Planning for technology infrastructure is a legitimate important issue for DE professionals. However it is also important to realize that planning, implementing, and managing DE programmes is a complex (but not complicated) task. Complex systems consist of components that depend on each other for their functioning. They should be analysed in their entirety and as a whole for the planning process to succeed” (p. 2).

He goes even further when explaining that complex systems are hierarchical too; “each level of complexity cannot be entirely explained within its own boundaries. At times a higher level is needed to reveal the order of the one subsumed by it, however chaotic it may look. The chaos of potentially unlimited variables interacting with each other at one level system complexity can be explained in patterns of behaviour only observable at a higher level of the component” (p. 2). “To bolster the efficacy and longevity of the system under construction, planners need to take all of these system levels into consideration simultaneously” (p. 3). “Another important point about this hierarchy is that none of these levels is more or less important than the others (…). The well being of each level, however, is dependent on the proper functioning of all of the other levels. They affect each other directly, and are affected by each other directly as the flow of time continues” (p. 3).

In the late 1980s, Nipper published a piece of work that includes a well-accepted classification of DE, although many theoreticians have criticized the technocentric nature of his classification. It divides DE into three different generations: (1) corresponding teaching through phone counselling and face-to-face tutorial; (2) multimedia DE (e.g. the UKOU) through broadcast, print media and to some degree, computers; and (3) the tele-education and ‘third generation’ DE. These “terms: first, second, and third generation distance learning refer to three models of DE, which are linked historically to the development of production, distribution, and communication technologies” (Nipper, 1989; p. 63). He explains that “the main objectives of the first and second generation systems have been the production and distribution of teaching/learning material to the learners. Communication with learners has been marginal, and communication amongst the learners has been more or less non-existent” (p. 63) (…). “However, communication, and learning as a social process, will be the key elements in the conceptual development of third generation models of distance learning” (p. 64). Although he provides a rather technocentric view, it does not mean that Nipper does not acknowledge the importance of taking into account the social factors as well. For example, he points out that “it is our firm conviction that the social factors may turn out to have greater impact on the learner than anticipated” (p. 68). However, further research is needed to identify those social factors. In this thesis, there will be identification as well as examination of those social factors hence this gap intends to be filled.

Peters (1993) examines DE from an industrialization perspective (Peters, 1967; Peters, 1973; and Peters 1989). “It could be demonstrated that its structure is determined to a considerable degree by the principles which govern the industrialization of the working process in the production of goods. This means that DE is also strongly
influenced by such principles as for instance, rationalization, division of labour, the assignment of fragmented tasks to specialists, mechanization and automation. Peters (1993, p.39) argues that some striking similarities are:

- The development of distance study courses is just as important as the preparatory work prior to the production process;
- The effectiveness of the teaching-learning process is particularly dependent on very careful planning and adequate organization;
- The function of the teacher is split up into several sub-functions and performed by specialists as, for instance, in the production process at an assembly line;
- DE can only be economical if the number of students is great: mass education corresponds to mass production;
- As is the case with the production process, DE needs capital investments, a concentration of the available resources, and a qualified centralized administration.

Harasim (1990) “examines on-line education from the perspective of how it facilitates educational collaborations, especially where the activity takes place primarily on-line, in a computer conferencing system” (p.39). “Educational computer conferencing is a new phenomenon, appearing in the early 1980s. Its use grew significantly in that decade, but theory building was attempted only in the later part of the 1980s” (p.41). According to Harasim (1990) asynchronicity expands user control over the time of the interaction, and increases the time available to read or reread a message and formulate a comment” (p.46). “User reports indicate this feature contributes to learning effectiveness” (Harasim, 1986; and Hiltz, 1986) (p.47). Harasim argues that in CMC [Computer-Mediated Communication], users “have more control over the nature of their interactions than they have in face-to-face environments” (p.52).

1.5.1 Underlying theories

Moore’s (1993) theory of transactional DE is an interesting one. He explains that “the special teaching procedures fall into two clusters; in addition a third cluster of variables describes the behaviours of learners. The extent of transactional distance in an educational programme is a function of these three sets of variables. These are not technological or communications variables, but variables in teaching and in learning and in the interaction of teaching and learning. These clusters of variables are named dialogue, structure, and learner autonomy” (p.23). Rumble (1986) explains well the term transactional distance by Moore (1983). “Transaction distance is a function of two variables called ‘dialogue’ and ‘structure’. It refers to the distinction between psychological distance and physical distance. Dialogue describes the extent to which, in any educational programme, learners and educator are able to respond to each other. (...) A programme by correspondence is more dialogic, yet not to the same extent as one in which correspondence – or radio or television – is supplemented by telephone communication”. (...) “Structure is a measure of an educational programme’s responsiveness to learners’ individual needs. It expresses the extent to which educational objectives, teaching strategies, and evaluation methods are prepared for, or can be adapted to, the objectives, strategies, and evaluation methods of the learner”. Figure 1.7 illustrates this concept.

![Figure 1.7: The concept of transactional distance](image)

According to Moore, in the 1960s there were two theories that appeared to be “at war with each other”, the humanistic and the behaviourist. While the humanistic “gave special value to interpersonal, generally open-ended and unstructured dialogue in education, as in counselling, from which many of the educational techniques were
borrowed" (p. 31), the behaviourist gave great value to systematic design of instruction that was based on behavioural objectives with maximum teacher control of the learning process” (p. 31). According to him, “in the early 1970s DE was dominated by the behaviourists. However, in 1972, he published an article that challenged the behaviourist theory. It was named “learner autonomy – the second dimension of independent learning. In that article it was argued that university correspondence courses (the term ‘distance education’ was not yet used) were constraining the potential of their method by neglecting the ability of students to share responsibility for their own learning processes” (p. 31). As far as locus of control is concerned, another theory much cited in the literature is the constructivist theory of learning where the learner is provided with the necessary skills to build their own knowledge. “In DE it has always been necessary that the learner takes over responsibilities for his own learning – a function which in other circumstances rests with the teacher or the teaching institution. The learner therefore is given the opportunity to develop self-determination, self-direction and self-control to a high degree” (Peters, 1993; p. 46).

“Although many proponents of DE expect the development of teaching material which is truly self-instructional – which means that it can be studied without the help of a teacher – it is also well understood that social interactions in face-to-face situations are important”.

(Peters, 1993; p. 47)

Peter’s views are agreed, however, many researchers and practitioners are still debating the importance of face-to-face in DE. In this thesis an answer will be provided to whether face-to-face interactions are important and necessary in a DE programme. “This situation calls for the design of new models of DE. They will probably be combinations of intensified and sustained group work – highly sophisticated ways of acquiring the necessary information for self-study and increased telecommunication between the participants. They will have different sets of goals and objectives. And they will have to rely on self-directing and self-controlling – that is, on students becoming autonomous” (Peters, 1993; p. 57).

“As far as socio-technical systems are concerned, the models suggested by Garrison (1985) and by IDE (1997) have provided a significant contribution. Garrison’s model differs not only in the types of technologies that are used, but describes various DE media within the context of interaction and independence. IDE’s model incorporates an important component: the locus of control over the pace and place of instruction. The views of the Garrison and IDE have provided a useful framework for this thesis, but nevertheless, the authors would like to incorporate a third dimension” (Hiratsuka & Eason, 2001), see figure 1.8.

![Figure 1.8: Three models of DE (from Hiratsuka & Eason, 2001)](image)

*Figure 1.8: Three models of DE (from Hiratsuka & Eason, 2001)*

**Model 1 (M1):** In this model, the technology used is video/audio conferencing via ISDN (Integrated Systems Digital Networks). There is very little or no flexibility provided to the learner since they have to be located in the studio at the time of the lecture, which means that the pace of learning is the same as if it was in a traditional educational setting. As far as locus of responsibility goes, there is little or no change from the traditional model since the lecturers still control most of the teaching/learning processes.

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1 Hiratsuka is the author of this thesis' former single family name.
**Model 2 (M2):** In this model, the technologies used are multimedia packages and CD-ROMs. The learners have obtained a great deal of control over their pace and place of instruction, so flexibility increases. As a result, their responsibility over their own learning also increases but they are still dependent on their lecturers' support. Furthermore, 'pre-packed' instructional material usually does not meet specific learners' needs which leaves room for the lecturer's role to fill this rather common gap.

**Model 3 (M3):** This model refers to the use of network technologies and computer conferencing. There is a great deal of flexibility due to a high level of locus of control and thus the learners assume even more responsibility over their learning. The lecturers' role is affected as they have to spend more time learning new tools, preparing the teaching materials, planning online discussions, providing support to learners, and assessing learners' work and progress. As a result, in this model of DE, the higher education institution has to support not only its learners, but also its lecturers in several ways.

### 1.6 Approaches to the design of Distance Education (DE)

#### 1.6.1 Student-centred

According to Devlin (1993), "DE is typically student-centred. Learners are encouraged and facilitated to pursue their own needs and preferences within the subject matter under study, enabling a broad range of learning outcomes and substantial tolerance of individual differences" (p.254). "Unlike the teacher-centred models that view the learner primarily as a passive recipient of knowledge from an expert, collaborative or group learning is premised upon a learner-centred model that treats the learner as an active participant" (Harasim, 1990; p.43).

"Add to this, the cultural dimension of the new learner, ever active, browsing through continuous stream of new knowledge reflective of rapidly developing technology and a fast-changing task environment, a learner becoming more and more an integrator and problem-solver, and increasingly responsive to cognitive rather than behavioural stimuli. Taken together, we have, in these factors, the probable future shape of all training, not only simply distance training, and we can see the trend line towards the inexorable extinction of today’s training, making way for a new order of training through technology where the learner is empowered and where the prime prerequisite task is to learn how to learn".

(Devlin, 1993; p.268)

#### 1.6.2 Institution-centred

In this approach to the design of DE programmes, the focus is on the educational institution, e.g. universities. Thus the design is based on the institutions' needs, aspirations, goals and philosophies. The drawback of this approach is that satisfying students' learning needs is not always a priority nor it is specified by the organization which sponsors the students' learning. Rumble (1986) argues that "they [the institutions] define the educational aims and specify the objectives, content, and learning tasks required of those taking their courses, the conditions under which learning occurs, and the means of evaluating the learner's achievement, in ways that are fundamentally incompatible with a humanistic, person-centred approach to education" (p.27). Therefore drop out rates can be an issue if students are not satisfied with their learning experiences.

#### 1.6.3 Society-centred

Unlike the previous described approach, society-centred approach to the design of DE programmes tends to focus on the needs of the local community, e.g. of a local college, state community, state university and so on. The target population will depend on the goals of the institution strategy. Rumble (1986) adds that "this kind of approach is very different to institution-centred models where the emphasis is on institution" (p.34). "The purpose of the educator is to help the whole community to identify what is to be learnt, to find the resources for learning, and to evaluate what has been learnt" (p.33-34).
1.6.4 Organization-centred

Distance Training, conversely, is driven and controlled principally by the needs of the organization. These needs include "to have effective and generally task-oriented skills acquired by trainees in the most cost-effective manner possible. The role of defining the student's learning and competence needs is assumed by the organization" (Devlin, 1993; p.254). "Organizations develop and implement training strategies and programmes specifically and solely to improve their own performance. Training is evaluated in terms of its effectiveness, that [in this case] is the extent to which it generates performance improvement and efficiency, and in terms of the costs associated with this performance improvement" (p.255).

1.6.5 Co-operative ventures

According to Dasher-Alston and Patton (1998) "to address these issues, among others, colleges and universities have begun to establish co-operative ventures and partnerships with other academic institutions, corporate universities, and employers using networked technology" (p.12). "The use of compressed video to link the branch campuses and extension centres of a single institution, multiple institutions, or a campus to a work site is just one way which academe is beginning to respond to these needs" (p.13).

1.7 Research gaps

A number of research gaps was identified in the broad literature review. For example, Lanfranco (1997) presents a conceptual framework for situating ICT [Information and Communication Technology] within organizational structures and social processes in order to contribute to better policy and management decisions around the uses of ICT for development. Lanfranco’s meta-level conceptual framework provides a general contribution to the impact ICT has on a socio-technical system, however, due to the generic purpose of his framework, it lacks filling the gaps of the issues underlying network technologies in a rather specific DE context. As such further research is needed to focus on the DE setting. This thesis will focus on conceptual frameworks and models for the planning of effective DE programmes and to do so, a series of socio-technical frameworks and models will be built regarding the issues surrounding network technologies in DE settings. Other research gaps identified were the lack of research on the impact of the use of multiple technologies in DE settings and the limited conceptual frameworks specifically built to a better understanding of the field of DE. As Nipper acknowledged, further research is needed in identifying and exploring the social factors underlying the DE experience. In this thesis there will be a series of case studies aiming at filling these gaps. The literature review has also indicated a fragmented view of very specific issues in DE rather than a piece of research that integrates and discusses its relationships in a structured manner. For example, in response to the limited or fragmented conceptual development of past audio teleconference research, Rothe (1983) offers a conceptual framework "to serve as the basis for further reflection and refinement so that more rigorous research can be conducted" (p.199). Although, Rothe’s conceptual framework provides a contribution to the DE via audioconferencing, it can only and solely be useful for further investigation into audioconferencing. Whereas, the conceptual frameworks that will be built and presented in this thesis, will serve a different and hopefully a more valuable objective. They will be aimed at being an aid tool for planning effective DE, regardless of the technology, which is a variable constantly and indeed rapidly evolving.

In addition, Vrasidas and McIsaac (1999) advocate that there is a strong need for more empirical research to be conducted that can provide guidelines for structuring and evaluating on-line environments. They point out that structure is crucial for promoting interaction and social presence in DE, thus interaction needs to be carefully planned. McIsaac and Gunawardena (1996) acknowledge the importance of the social system in the investigation of the DE phenomenon. They explained that “the social context in which distance learning takes place is emerging as a significant area of research. Theorists are examining how the social environment affects motivation, attitudes, teaching, and learning” (p.407). “Technology-based learning activities are frequently used without attention to the impact on the local social environment” (p.408). These latter authors suggest that further research is needed to identify how technology interacts with students and how it affects teaching and learning. “Research findings suggest that it is the combination of personal (such as learning style), environmental, and social factors that must be taken into account when predicting academic success in distance learning programmes” (McIsaac & Gunawardena, 1996; p.425). Therefore, the fieldwork carried out and reported in this thesis will focus on offering a contribution to these identified gaps and the literature review of the next chapter is led by them.
1.8 Objectives

Primarily, this research aims at understanding the DE phenomenon and its existing variables. After achieving a general understanding of DE, and identifying the relevant variables, conceptual frameworks are built to help understanding its variables relationships and how they affect each other towards the process of generating specific students’ outcomes. In order to obtain such understanding, in-depth case studies will be carried out in an evaluative fashion. Following these achievements, the current research will go further onto the development of a range of aid planning tools for the early planning stages of an effective DE programme. This range of tools will be a series of frameworks that are designed based on that understanding obtained by carrying out three comprehensive major in-depth case studies as well as the literature review. In order to test the validity as well the reliability of the aid planning tools, a Likert-type questionnaire will be designed, strictly based on the tools, and administered with managers of DE who are in the process of planning their DE programmes. Although this section summarizes the general aims, specific objectives of the work carried out and described in each chapter are presented in its correspondent chapters.

1.9 Justification

General attempts were and are still being made to replace human work by computers. However, human factors practitioners have been trying to convince the technological developers that there are certain specific human tasks that cannot be automated (at least not yet) (i.e. carried out by electronic devices). When DE became popular and saw as if it would revolutionise traditional education (TE), people started to be overexcited about its technological benefits and capabilities without paying careful attention to the human consequences (e.g. social aspects) of an inappropriately designed programme.

As a consequence of this ill-conceived circumstance, there has been a range of unwanted students’ outcomes – reports have shown drop out rates as high as 50% in DE programmes – in DE programmes worldwide. Therefore, this thesis will benefit the planning of successful DE programmes that minimizes negative students outcomes by adopting a socio-technical approach to the early stages of designing an effective DE programme. Another reason, rather economic, for conducting this research is gathering data, analysing it and than deciding on an implementation plan that has a high possibility of success while avoiding expensive pitfalls (Albrecht & Bardsley, 1994).

1.10 General research questions

In this section, a set of general research questions is presented. These general research questions have arisen from the current broad literature review. In the next chapter, a set of more specific research questions will be presented as a result of the specific literature review (chapter 2).

- What are the human factors issues in delivering education at a distance?
- What kinds of issues (i.e. variables) affect the effectiveness of DE programmes?
- What kinds of issues impact students’ achievement in DE settings?
- What are the causes of successful DE programmes?

In the next section, figure 1.9 illustrates the thesis structure. Each box represents a chapter.

1.11 Thesis structure

As shown by figure 1.9, the thesis structure is divided into four main parts. Part I refers to the background which includes chapters 1 and 2; part II provides an outline of the methodology: chapter 3; part III is concerned with the major fieldwork which includes five chapters – chapter 4, 5, 6, 7, and 8; and part IV presents the conclusions (chapter 9).
Chapter 1 introduces the field of research as well as provides relevant background information, research objectives, justification for the research, and the general research questions. Chapter 2 presents an overview of the most meaningful research done in the field followed by constructive critical comments to support current research. The results of this review were the identification of major categories for in-depth investigation. Chapter 3 outlines the research methods used to carry out the study and the criteria adopted to build research instruments and to analyse the results. Research methods, strategies, and paradigms were chosen in order to most appropriately study the major categories identified in the literature review of previous chapter. Chapter 4 reports case study A, a conceptual framework is developed and presented to support the understanding of this form of DE at the end of this in-depth case study. Chapter 5 reports on case study B, followed by a conceptual framework that explains this form of DE. Likewise, chapter 6 reports on case study C and also presents a conceptual framework of this kind of DE. Chapter 7 presents the cross-case study analysis and the conceptual frameworks and models for planning effective DE because all the case studies to be investigated are cases in which DE is being used. Chapter 8 reports case study D, which is divided into several sub-case studies of DE being planned. Data collection instruments were designed, data gathering performed and analysed to test the reliability and viability of the frameworks for planning effective DE (the planning aid tool). The level of importance of each issue (i.e. variables) in planning effective DE is identified and frameworks are updated. Finally, chapter 9 outlines the major conclusions and suggests guidelines of future research for the continuation of this work (see figure 1.9).
Figure 1.9: Thesis structure
Chapter 2

Research in Human Issues of Distance Education

2.1 Chapter outline

This chapter provides a critical overview of the previous and relevant research in the field of Distance Education (DE) in light of the current research gaps. Research gaps will be emphasized to support the contribution of the work done in this thesis to fill those gaps. The purpose of the chapter is, to narrow the research context to the issues in delivering a DE course and the factors that need further investigation for the planning of effective DE programmes; and, to utilize the existing literature to support and justify the objectives of this research. Figure 2.1 illustrates an overview of the thesis structure in which the shaded box represents chapter 2 in relation to overall thesis structure.

![Figure 2.1: Chapter 2 in relation to overall thesis structure](image)

2.2 Introduction

The practice of DE is not a new one. It has been practised since the first correspondence courses in the US and Europe as seen in the previous chapter and evolved into what it has been named Distance Education (DE). As such, evolution of the field has been extremely affected by the current context imposed by the post-industrial era. Specifically, by the paradigm shift from past values to today’s values. What used to be valuable before has no longer such a value, and nowadays what is valued is the knowledge people build from a range of information, through using Information Technology (IT). “We are, now living though in what is termed a post-industrial society, dependent increasingly on knowledge-based industries, Information Technologies and Communications” (Bates, 1993; p.214). The current economic environmental pressures, imposed by government bodies and funding agencies, to make higher education available to a broader audience in the society, create a perfect context for these higher education institutions to seek alternative solutions to their current traditional educational practices. For many higher education institutions (e.g. universities), DE seemed to be a perfect solution to deal with those pressures because it reaches a wider audience of students (e.g. adult working professionals) who would not otherwise be able to attend campus-based classes due to work, family, or social commitments. “This is not to argue that this inevitable trend is necessarily in the best interests of learners; whether or not third-generation institutions are effective will depend not so much on whether they use new technologies, but on how those technologies are applied” (Bates, 1993; p.214). Adult working professionals are suffering pressures from their superiors and from the limited job availability in the
market place, to constantly update their knowledge and skills to cope with current challenges such as the mastering of new network technologies and maintain employability. "Learning is a lifelong pursuit" (Berge & Schrum, 1998; p.32). In light of such a context, research on DE suggests that it has been regarded as the economic solution for reaching a broader audience. Bates (1997) says that "some politicians and business people saw technology simply as a replacement for labour, and therefore anticipated that technology when applied properly will reduce the costs of education. Unfortunately, this is to misunderstand the nature of the educational process" (p.95). "Increased pressure relating to employment schedules, finances, and family responsibilities, as well as the high-cost of post-secondary education and the limited availability of scholarships, has created an increased need for DE" (Abrahamson, 1998; p.33). "(...) State legislatures [in the US] could easily see such a model [DE] as an attractive way to cut their expenditures for higher education (...). In such an evolution of DE, colleges and universities would be reshaped as profoundly as US business has been altered by technologies enabling the global marketplace" (Dede, 1996; p.203). "Even though DE may appear to represent an economic solution to the problems of resources availability and access to educational opportunities, attention must be paid to underlying academic needs and processes" (Albrecht & Bardsley, 1994; p.68) as well as the issues and factors (i.e. variables) affecting its effectiveness.

"On the other hand, for some of the institutions that utilize high-tech instructional delivery systems (e.g. videoconferencing), the promise of distance learning as a way to control costs has proven to be just that – a promise. The tremendous up-front investment of resources needed to establish an adequate technological infrastructure (e.g. equipment, facilities, curriculum development and design, training), to offer ongoing support by qualified personnel, and than to maintain it has tempered the expectations of more than a few institutions. The financial constraints have prompted some institutions to partner with other colleges and universities in an attempt to marshal resources" (Dasher-Alston & Patton, 1998; p.13). DE seems to have a tremendous impact on the players who are directly affected by the implementation of DE technologies. That impact has been underestimated or fragmented and thus partially understood by the early research in the field. This chapter outlines some of the most relevant previous research and the various issues that arise from this review.

2.3 Research on the effectiveness of DE delivery media and technologies

Research on the effects of DE has traditionally focused on students’ outcomes (Ahern & Repman, 1994; p.537). As the utilization of new instructional technology becomes more popularized in the support and delivery of instruction, "new questions are being raised concerning the effectiveness of traditional pedagogical methods in alternative learning environments" (Ahern & Repman, 1994; p.537). The need for increased research into the effectiveness of DE is acknowledged in the literature (e.g. Moore, 1990a; Moore, 1990b; English et al., 1998; Fisher, 2000; and Willis, 1993). However, before starting to outline the previous research on effectiveness of media and DE technologies, it is necessary to clarify the term effectiveness. The literature examined seemed to demonstrate a lack of consensus in defining effectiveness. "Effective learning can mean many things. In the Hiltz (1986) study, learning effectiveness was measured by 'whether students take a more active part in the learning process and take advantage of the potential for more interaction with the professor and the other students, despite the absence of nonviable cues to facilitate this interaction' (p.100)." It was also noticed that effectiveness in DE was the extent to which students learnt (Norman & Spohrer, 1996). "With the new style of education the traditional measures of effectiveness – test scores – are not necessarily appropriate. Traditional tests measure declarative knowledge: learned recitations and applications to small problems. They do not necessarily address depth of understanding or the skills the students have acquired" (Norman & Spohrer, 1996; p.26). However, throughout this thesis, effectiveness means the extent to which predetermined goals are met (English et al., 1998). "Goal achievement is one of the criteria used to assess the effectiveness of a course". Therefore, it is dependent upon the goals of the educational institution. If the institution is student-centred, then the effectiveness of a DE programme is the extent to which it meets learners' needs (Collis & Smith, 1997; and Eastmond, 1994). Eastmond (1994) stated that "(...) the success of a programme in DE must be judged based upon the learners' needs determined in the needs assessment. If the programme does not meet these needs, it must be judged as ineffective" (p.99). Whether it is organization-centred or society-centred, it all depends on the model of DE of the educational institution. As cited by Ahern and Repman (1994), Levin et al. (1990) concurred and speculated that "once we have a more detailed understanding of the nature of interaction, we will be in a good position to address the issue of which medium is effective and for what purpose"(p.185).

Koble and Bunker (1997) found that in the late 80's, literature in DE focused on establishing a consensus for defining DE and thus establishing it as a field of research. About only 20% of this literature was about the
effectiveness of DE, evaluation, and methods of delivery, and media usage in different contexts. "With the dramatic increase in the number of articles on media, it is not surprising to note a corresponding trend in the number of reports on evaluation and effectiveness. These evaluations of media and delivery systems and comparisons of effectiveness accounted for almost one-half of the articles in this category" (p.31). Research on issues about planning, policy and financial management accounted for only 15% of the articles reviewed. Even more disappointing was that DE course evaluation and curriculum development represented only 10% of the articles reviewed and they were published in the late 1980s. As these authors explored the trend in the research in the field of DE, it is interesting to note that research continues to be done and published providing more evidence of the effectiveness of DE in different contexts (p.35).

On the other hand, it was noticed that articles on students' administration and support were disappearing from the publishing scenario. "However, dual mode institutions that are now developing DE programmes and new delivery systems must also begin establishing and standardizing admission procedures and support systems to accommodate distance learners. Just as recent articles in the journal indicate an increasing awareness of the role of the instructor in DE, we would also hope to see an increase in the number of articles addressing student support issues" (p.36). It is therefore important to clarify here that the above mentioned views reflect those of the North American researchers in the field of DE in higher education thus it can only be understood as measures of trends.

"A primary goal in studying a new medium of communication for educational delivery must be the identification of effective and ineffective ways of using it. The relative effectiveness of a Virtual Classroom (VC) is contingent not only on hardware and software capabilities of the medium, the nature of the course materials, and the characteristics of the students. Learning outcomes in the VC depend on whether or not teachers and students take advantage of its potential to support an active learning process that incorporates extensive interaction among students and between instructor and students (Hiltz, 1986). A successful outcome also requires adequate access to the necessary equipment (PCs and modems), so that the students may easily access the facility".

(Hiltz, 1993; p.474-475)

Willis (1993) stresses the importance of meeting students' needs in effective DE. He explains that "to function effectively, students must quickly become comfortable and competent with the realities of teaching and learning at a distance. Efforts should be made to adapt the delivery system to better meet the needs of the students in terms of both content and preferred learning styles" (p.105). As such, the present thesis will pay a great amount of attention to the students support services as well as other relevant services.

2.4 The "no statistically significant difference" phenomenon

Several researchers have come to the conclusion that there are no statistically significant differences between the learning outcomes of classes taught traditionally and classes taught at a distance by means of a number of educational technologies (English et al., 1998; Threlkeld & Brzosk, 1994; Willis, 1993; and McIsaac & Gunawardena, 1996). It has than been a common phenomenon encountered in these types of research practices.

"The most common theme in DE research is that which compares two or more media in relation to their effectiveness: 'does it teach better than (...)' Typically these studies are comparisons of traditional instruction with instruction by media such as computers, television, and radio. Although they often show some slight advantage for one medium or another, the most common outcome is 'no significant difference' between mediated and face-to-face instruction. Literally hundreds of media comparison studies have been performed over the past forty years, and the results have been uniform: the instructional medium does not appear to make any important difference in student achievement, attitudes, and retention".

(Threlkeld & Brzosk, 1994; p.42)

Willis (1993) confirms that numerous studies have been conducted to explore the comparative effectiveness of distance and traditionally delivered instruction (e.g. Levin et al., 1990; Russel, 1999; and Dominguez & Alexander, 1999). "The majority of studies concluded that distance-delivered instruction could be as effective as traditional instruction if the delivery methods were selected based on: background and experience level of the student, cognitive style of the learner, diversity of students participating in the course, and appropriateness of the content being delivered" (p.11-12). "Finding no significant difference between technology-based and conventional face-to-face instruction should come as no surprise. Consider, for example, the following: Is a computer-based word processor instructionally more effective than the pen? Of course not. This is because distance-delivery technology, whether it be television, computer, or pencil, is a mere vehicle or medium of delivery and has little influence over student performance, as long as its characteristics are appropriate to the task at hand, and the instructional design is effective" (p.16-17). The well-popularized statement that what matters is what we use the technology for is agreed
because we need to explore the effectiveness of the media for certain specific learning tasks and not for learning performance overall. As a result of the evidence found in the literature reviewed, this thesis will not conduct comparative studies since it is therefore, a well-accepted statement that there is no statistically significant difference between DE and TE in terms of effectiveness. Rather, it will look at the usage of several DE technologies and the attitudes of lecturers and students towards DE; and at the totality of factors affecting specific learning goals in particular cases.

### 2.5 Some issues in implementing and delivering DE

#### 2.5.1 “Too much focus on delivery systems?”

A significant proportion of the literature reviewed tends to focus on technical systems, therefore neither leaving enough room for exploring the social impacts of the technology nor for understanding their underlying issues. This statement also seems to be acknowledged in the literature. For example “(...) most of the higher education community tends to focus on the high-tech delivery systems when thinking about DE” (Dasher-Alston & Patton, 1998; p.12). Some of the literature reviewed appeared to be quite optimistic when discussing the advantages the technology can bring to DE settings (e.g. Oliver, 1994; Hiltz, 1986; and Chang & Chen, 1995) emphasizing only the positive aspects of it (Ragsdale, 1988; Sherry, 1995; and Dede, 1996). Ragsdale (1988) explained that this is, “at least, partly due to the screening effect of the popular press, who favor the excitement of extremism over the calm of rationality (...)” (p.50). According to Saba (1999b), Agnew (1996) and Minoli (1995) provide a good overview of technical aspects as well as applications of some technologies for DE. Moreover, Bourne et al. (1997) described a model for implementing on-line learning in Engineering Education. “The model proposed is based on a World Wide Web implementation that includes presentation materials, on-line conferencing, demonstrations, and interactive capabilities that permit computer-mediated question and answer sessions” (p.73). Although their model has provided a contribution to implementing the technical systems, it does not take into account the social aspects. “Typically, the models have focused on the technical system (i.e. DE media) and thus do not describe the human, social aspects that are affected by the technology” (Hiratsuka & Eason, 2001). Hiltz (1986) reported initial results from one of the first major studies of the virtual classroom, which offered an important contribution to the field. For example, “one important requirement for realizing the promise of new educational technologies is to use them to create new learning and teaching environments that are more effective and exciting for at least some kinds of materials, rather than merely trying to replicate the traditional classroom electronically” (Hiltz, 1986; p.104). Even though it is generally agreed with her statement, it reported early and initial findings that might have been quite optimistic.

Although Dede’s (1996) article offers a contribution to the literature of the field, it is focused on the technology, and not enough attention seems to be paid to the effects DE has on stakeholders. Furthermore, it appears to emphasize the positive aspects of adopting emerging technologies and not enough investigation has been carried out to explore the impact they have on stakeholders. Another example from the reviewed literature that may fall into this category was the contribution made by Jacobson and Levin (1995) where they “discussed conceptual frameworks for systematically developing software tools for network-based learning environments that can help students and teachers construct personal and shared knowledge spaces” (p.383). Moreover, Jaffee (1998) states that “most of the literature on ALNs [Asynchronous Learning Networks] has focused on the pedagogical and technological advantages of this educational delivery mode and the way ALNs can respond to the changing demands and pressures placed on institutions of higher education. However there are considerable obstacles preventing the widespread implementation of ALNs” (p.21). Jaffee’s article addresses some of the problems with the popular optimistic scenario for change and considers some of the institutional and cultural sources of resistance and opposition that are mentioned in the next section (2.5.2). “Although technology plays a key role in the delivery of DE, educators must remain focused on instructional outcomes, not the technology of delivery. The key to effective DE is focusing on the needs of the learners, the requirements of the content, and the constraints faced by the teacher, before selecting a delivery system. Typically, this systematic approach will result in a mix of media, each serving a specific purpose” (Riedling, 1999; p.11). “Overall, the technologies exist – what matters is how we use the technologies” (Riedling, 1999; p.13).

“Experienced distance educators know that it is difficult, if not impossible, to choose one medium of communication and expect that all teaching and learning needs can be met by that medium. Successful DE systems may select a primary medium of communication such as broadcast television or the World Wide Web. But usually, for technical, legal, and pedagogical reasons, they include the use of other media”.

(Saba, 1999a; p.1)
Saba’s above statement is agreed, however, further research needs to clarify and provide a better in-depth understanding of the multiple technologies’ usage in different DE settings. In fact, the title of this section was very much inspired by the article “Planning for Distance Education: Too much focus on delivery systems?” by the same author published in 1999(d). He highlights that “rarely there is only one medium of communication involved, while countless hours are spent on defending or attacking a particular medium in decision-making meetings” (p.2). Mason (1998) states that “technology is rarely the problem – and equally rarely the solution!” (on-line). The work reported in this thesis is aimed at building conceptual frameworks to satisfy this and other needs identified in the literature. As far as the usage of multiple technologies is concerned, case study C, in particular, reported in chapter 6, will provide a better understanding of such phenomenon.

2.5.2 Organizational change

There has been significant research undertaken in the field of organizational change as a consequence of implementing new IT systems (e.g. Eason, 1988; and Jaffee, 1998). This change is a natural reaction to implementing new technologies. “Organization theories that conceptualize organizations as rational or adaptative entities would expect higher education to respond and develop internal means and structures to adapt and meet the demands of this rapidly changing environment” (Jaffee, 1998; p.21). However, organizational change does not happen easily. There is often resistance, as a natural reaction, to such change. Organizations are social constructs and as such, people form a major element of an organization. Although people seem to be the most able adapting element to new situations and technologies, people are not always receptive of changing their activities, roles and responsibilities if they are satisfied with the results of their work (done traditionally). In a university context, lecturers are expected to reveal some resistance to the adoption of non-traditional methods of education, e.g. DE and its new technologies. In the late 1980s, Kaye’s publication acknowledged a concern about the introduction of new technologies into traditionally conservative educational organizations. He advocated that “it is bound to have implications for the ways in which the organization functions (unless, of course, the technology is rejected, in which case it is often taken up and exploited by new organizations, who compete for the same clientele)” (Kaye, 1989; p.18). “In case of on-campus universities or colleges, where use of CMC [Computer-Mediated Communication] on local area and wide area networks is developing, it is still not clear what the organizational and social repercussions will be: what is certain is that the innovation process needs to be handled with care (…)” (Kaye, 1989; p.18). “There are signs that some conventional universities, with good leadership and a shared vision, and sometimes goaded by strong external pressure from government, are re-generating and re-structuring themselves to meet the technological challenge. Whether they can do this fast and deep enough to meet growing competition from the private sector remains to be seen” (Bates, 1997; p.103). “Furthermore, the changing nature of the workforce in the Information Age requires workers who will undertake a continuous cycle of retraining and retooling (Dolence & Norris, 1995). There is a concern about how quickly traditional post secondary-degree-granting institutions will be able to respond to these changes to satisfy the educational needs of this growing segment of society” (Dasher-Alston & Patton, 1998; p.12). “Third generation technologies though will require some radical changes in the management and structure of distance teaching institutions, and those that fail to adapt will find themselves under increasing pressure from new institutions set up specifically to exploit these technologies” (Bates, 1991; p.14). Under the circumstances of the optimistic scenario for adopting new technologies without careful consideration of their implications, “institutions of higher education have failed to conform to either of these organizational models. Instead we often find inertia, defence of the status quo, denial, and opposition and resistance to change” (Jaffee, 1998; p.22).

“The optimistic scenario that predicts the rational application of instructional technologies rests upon two basic assumptions. The first is that organizations will adopt alternative practices and techniques if they can be shown to enhance organizational productivity. There are those who believe that instructional technologies, from video transmission to ALNs, will solve many of the productivity problems currently facing higher education. (...) The stated expectation is that the infusion or integration of new technologies into instruction will, at minimum maintain and ideally enhance student learning while significantly reducing instructional costs”.

(Jaffee, 1998; p.22)

This author concludes that “in reality, organizational change is contingent on a set of social and human social factors and dynamics that are much more difficult to manage and manipulate. In academia, obstacles to change are closely associated with the established practices and cultural traditions of the teaching faculty” (…) “Thus one can neither understand the obstacles to organizational change nor develop strategies for implementing change without a consideration and analysis of faculty practices and academic culture” (Jaffee, 1998; p.23): Wagner (1993) stated that “DE programmes are perhaps most notable because of their roles as catalysts of organizational change. Management of change process, while simultaneously managing new technologies, is an increasingly important component of designing distance educational systems. This underscores the importance of anticipating the need for
new or adaptive organizational structures to deal with the changes wrought upon organizations as a consequence of the use of the technology" (p.31-32). Wagner goes even further explaining that “limiting management attention to the new technology systems alone may very well limit a project's potential success, since it tends to focus upon the means of change rather than upon the ends or consequences of change. It is also very useful to consider the impact of technology-based change upon staffing, work design, job descriptions, departmental structure, and management oversight responsibilities” (Wagner, 1993; p.32). As such, in this thesis, attention will also be paid to the lecturers’ reactions, and attitudes towards DE. Moreover, in response to Kaye’s concern in the late 1980s, the work reported in this thesis will offer some contribution to the organizational and social repercussions of the implementation of DE, especially by means of network technologies.

The fact that some lecturers are less keen on teaching at a distance through DE technologies is acknowledged in the literature. For example Bourrie et al. (1997) explains that “(…) faculty do not want to change to a methodology that requires more work and has outcomes that are not much better than they are currently doing” (p.52). However, most of the literature reviewed provided issues from the North American Educational settings that significantly differ from the European system thus from the British system as well. For example, Gunawardena (1992) suggests that “distance teaching must be rewarded in the tenure and promotion system to encourage faculty to teach at a distance and to experiment with new technologies and methods of teaching. Other incentives that should be considered are adjustments in faculty course loads, the support of graduate assistants, or monetary rewards” (p.71). In North America, “faculty are usually unwilling to continue to teach DE courses as a perpetual overload responsibility. Faculty expect corresponding increases in pay when class size increases significantly over similar, place-based courses, or when these courses are not given the same weight when it comes to promotion, tenure, and career advancement” (Berge & Schrum, 1998; p.36). Furthermore, Sherry (1995) argues that “administrators cannot expect teachers to feel comfortable with the technology, to use it effectively, and to maintain it as well, without giving them extra resources and time”. In fact, this latter statement by Sherry could also be useful for the British system because of its generic nature.

2.5.3 The right balance between DE and TE

According to Holmberg (1980), “the most crucial media decision is if and to what extent ‘non-distant’ elements should be used. Whether or not to include face-to-face elements in a distance-study programme is a decision of considerable importance. Whereas one school of thinking finds face-to-face sessions essential, another finds them unnecessary and even, in some cases, harmful. No conclusive proof has been established either to prove the necessity of face-to-face elements or to reject them (…)”. Previous research have suggested that the right balance between the amount of classes to be delivered at a distance and the ones to be traditionally taught is an important issue (Dede, 1996; and Abbott, Dallat & Robinson, 1995) in planning successful DE programmes. Of course, it depends on the students’ availability to attend classes on campus, which for this new audience, is likely to be very limited if not non-existent. It will also depend on the amount of time released for these students by their organizations, if they are employed, as it is prone to be on most of the cases. The third aspect worth mentioning is dependent upon whether or not the course content requires elements of a traditional face-to-face instruction, and if so, to what extent. These are a set of gaps indicated by the literature that the study done and reported in this thesis aims at offering a contribution. The point is that whenever possible, face-to-face interaction tends to be a crucial element of DE thus necessary for a number of reasons. Therefore, further research is needed to clarify this point (details about it are explained further in this thesis, chapter 7).

2.5.4 Group work activities at a distance

Another issue identified in the literature is concerned with group work. Group work activities have been a challenge in DE not only for students but for lecturers as well. One of the ways of achieving collaboration in group work activities is through the use of computer conferencing as argued by Harasim (1990). “Computer conferencing has been adopted commercially, first within government, then by the corporate and scientific sectors, and more recently within the educational community” (p.41). Harasim (1990) argues that “traditional DE models emphasize the independence of the learner (Moore, 1986) and the privatization of learning (Keegan, 1986). The emphasis in DE theory and practice is on individual, rather than group, activity” (p.42). However, media have evolved and new tools are now available that enable easier communication at a distance among groups of students, although it is still a challenging issue. When using synchronous media (e.g. audio/videoconferencing), working with other classmates at a distance becomes a difficult activity. Most of the difficulties seem to be related to communication and interaction via synchronous media at a distance. Previous research has acknowledged some of these issues. For example, in Gunawardena (1992) “students both on and off campus found the group project the most challenging and, for some,
the most frustrating portion of the course. The major problem was related to difficulty of communicating at a distance” (p.65). The next section presents an exploration of these two variables, communication and interaction, that are so well interconnected.

2.5.5 Communication and interaction

Much has been said in the literature about the importance of virtual community to support students' learning (Harasim, 1990a; Harasim, 1990b; Hiltz, 1986; Hiltz, 1994; and Jonassen et al., 1995). Moreover, much of the teaching theory underlying DE has been about the constructivist environments. For example, Jonassen et al., (1995) advocates that “constructivists environments engage learners in knowledge construction through collaborative activities that embed learning in a meaningful context and through reflection on what has been learned through conversation with other learners” (p.13). Mason and Kaye (1990) acknowledged the importance of interaction between students and course material and resources and the communication established when students interact among each other. “(...) for effective learning to occur, the student must consciously interact with, and operate on, the learning material and resources at his/her disposal” (p.18). The extent to which students can initiate the communication process varies from one programme to another, but this is an important influence on their sense of control over their learning environment (Garrison & Baynton, 1987; p.19). Abrahamson's (1998) article focused on issues of communication and interaction. He suggests some solutions: (1) “(...) it is recommended that the primary instructor make at least one or two visits to the down link site [the site(s) where students are] and discuss both the course material and the appropriate use of this teaching format” (p.38); (2) “the efficacy of the course is dependent upon good technical support” (p.38); and (3) “low cost technological solutions include an 800 number, fax machines, and Internet access” (p.39). Daniel and Marquis (1979) provided an analysis of the appropriate balance between the two students’ activities in DE; interaction and independence. Their research is primarily concerned with multimedia distance study systems at the university level. These authors discussed a number of issues in DE, particularly in the contexts of interaction and independence. Although at the time of publishing their research, at the end of their article, they stated that “we must disappoint the reader who, having persevered thus far, is expecting a recipe for the ideally cost-effective and educationally efficient remote-learning system. Such a recipe is impossible, simply because a system can only be conceived in relation to the country and context in which it is set” (p.41). Although the political, cultural and technological context of a country will affect all components of a remote learning system it will have greater impact on what we have called the independent activities” (p.41). However, the authors point out that “the adult student is busy and pragmatic. His involvement with the remote-learning system is only a minor aspect of his life” (p.41). As stated earlier, in the previous chapter (1), the boundaries of the present research do not include all the political, nor the cultural implications of DE but rather focus on the socio-technical system and its relationships with the external environment. As far as collaborative learning is concerned, Thorpe (1998) points out that:

“The convergence of computing and telecommunications technologies has created a range of new possibilities both for the communication of knowledge and for the social interaction” (...) “CMC enables distance learners to engage in collaborative learning and discursive interaction with peers and tutors in a variety of communicative settings. However, the potential of the technology to deliver a more discursive and collaborative learning process has not always been achieved. Course designers are seeking to build constructivists pedagogy into the learning process so that students will perceive the use of computer mediated communication as essential for the achievement of the desired outcomes of the course” (p.265).

2.5.6 The importance of technical support

Students are the most challenged with dealing with the technological innovations brought by DE. However, lecturers must have proper training and development programmes as well (Willis, 1993; and Gunawardena, 1992). Gunawardena’s (1992) article “outlined the unique skills distance teachers must develop in order to provide effective distance learning experiences. A sound faculty development programme is necessary to help faculty assume their new roles and responsibilities. Institutional support and adequate support systems for distance teaching, coupled with opportunities for professional development, are essential to sustaining faculty motivation and recruiting new faculty to the distance teaching enterprise” (p.71).

As far as technical support within an organization is concerned, this paragraph presents the concept of a champion. The literature review indicates roles and responsibilities of the champion within an organization's DE training. For example, Driscoll's (1998) article offers a twelve-step pilot plan flowchart outlining the general steps for planning and implementing Web-based training. Although a step-by-step programme does not seem to be of extreme value for the planning of DE, it seems to provide some degree of flexibility. “You may need to add, delete,
or modify steps, based on your organization’s needs” (p.44). The contribution that this paragraph describes is the importance of having a champion. “In addition, work with your champion to define a training pilot topic. Choose one that fills the gap in skills or knowledge and that is visible to the entire organization. Mike Glass, vice president of training for Training and Development at Fidelity Investments, recommends, “a champion must be credible with the field and credible with the business [headquarters]. This person has to be able to convince field managers to take risks and to recognize the benefits of WBT [Web-Based Training]” (p.45). Moreover, Geffen (1999) argues that one of the key issues in implementing asynchronous learning into organizations is “finding a champion to spearhead the drive to cultural change, enhancing the computer literacy of their employees, overcoming resistance from the human resources department, and promoting the perception of value and effectiveness of this delivery system as a training tool” (on-line).

2.5.7 Achieving parity with traditional education

“One of the goals of distance learning is to achieve parity with traditional on-campus classroom education” (Abrahamson, 1998; p.38). Evidence was found in the literature to support this statement (e.g. Aoki & Pogroszewski, 1998). Although DE claims to open up new educational opportunities for those who cannot attend campus-based classes thus broadening audiences it still denies access to the less fortunate and less privileged level of the society. “(...) A university requiring all the students to have access to the Internet can, at an administrator’s stroke, deny access to all those students who cannot afford a computer, who are not skilled or confident in using a computer, or who cannot get Internet access where they live” (p.94). Another issue in trying to offer the same level of opportunity of TE students, who are based on campus or nearer compared with the distant students, is regarding counselling. Simerly (1999) points out that:

“The student desires to receive career planning and counselling services in a manner similar to those services provided to on-campus students. However, the career planning and placement centre is geared to provide the type of comprehensive services to DE students that they can provide to on-campus students. As a result, the new graduate becomes disillusioned with this lack of support and advises friends not to enroll in DE programmes offered by this institution” (p.45).

Aoki and Pogroszewski (1998) explained that “it has become almost the fad to put courses on-line, whatever it means, among those who teach college courses. However, putting courses on-line without careful planning for the construction of the entire learning environment for students will frustrate those students who take on-line courses with the expectation that they will receive the same benefits as students in the traditional classroom environments” (Aoki and Pogroszewski, 1998; on-line).

2.5.8 Students’ attitudes towards DE

A number of research studies have been conducted on the students’ attitudes towards DE (e.g. Bloomfield, 1997; Convery et al., 1999; Hara & Kling, 1999; and O’Malley & McCraw, 1999). As far as students’ factors are concerned, research on student discontinuation fall into two characteristics, on one hand, it focuses on dropout (Brown, 1996; Eisenberg & Dowsett, 1990; Garrison, 1987; Peters, 1992; and Sweet, 1986). For example, Brown (1996) investigated factors causing dropout in DE at a university in Australia. “Contrary to some other findings in this field, this research showed that factors ‘internal’ to the university were cited as major reasons for discontinuation. Insufficient support from tutors and difficulties in contacting tutors were major contributory factors to discontinuance for a majority (67.7%)” of a surveyed sample of 148 students (p.44). Sweet (1986) argues that pressures such as disruption of family life, perceived irrelevance of their [the student] studies and lack of support from employers result in higher dropout rates than among traditional students. On the other hand, it focuses on students’ persistence. For example, in 1995, Kember published a book in which he proposes a model of student persistence in open learning and DE courses for part-time adult students. Although Kember’s model offers a contribution to understanding the sub-social system i.e. students in a DE setting, it does not appear to consider the technical factors affecting students’ progress. Other students’ barriers to effective distance learning includes, students’ motivation or lack of it due to lack of communication and face-to-face interaction with lecturers and lack of lecturer’ support, and isolation. Covington (1993) has published a number of studies about students’ motivation. Motivation is a factor that influences students’ learning. According to Covington, “a willingness to continue learning depends heavily on the individual’s reasons (motives) for learning in the first instance” (p.50). More recently, a step forward seemed to be taken by Stage (1996) who argues that “today, motivational theories are widely recognized as critical in influencing behaviour and learning (McKeachie et al., 1990)” (p.229). The ACPA (American College Personnel Association) proposes to “create conditions that motivate and inspire students to devote time and energy to
2.6 The need for systematic planning

The need for systematic planning has also been well acknowledged in the literature reviewed. However, this has been rather fragmented due to not covering all the necessary issues which are very much dependent on each other according to a systems view of DE. Some publications focus on a particular issue, some on a combination of variables but none has attempted to structure all the most relevant issues and factors on a conceptual framework. Another aspect is that at many institutions, the effectiveness of DE methods has not been well researched prior to adoption (O'Malley & McCraw, 1999). These authors explained that many institutions of higher education are rushing into delivering DE without fully understanding how place and time affect students' learning. Rumble (1981) points out that DE raises "managerial problems of a high order. It needs extensive research and strategic planning to make effective use of the media available" (p. 182). "In the early planning of a project, emphasis will tend to fall on the goals, targets and objectives of the institution" (Rumble, 1981; p. 200). Rumble also states that "the first step in the planning process is to prepare a statement of goals" (p. 200). "Although often couched in general terms, a statement of general goals represents a step towards the evolution of objectives" (p. 201). "However, such statements must be based on an analysis of needs and the appropriateness of distance-learning systems as a means of solving particular problems; this does not always happen" (p. 201). Probably, the most valuable literature that contributed to the objectives of this thesis was the book by Moore and Kearsley published in 1996. In this book, the authors carry out an excellent examination of a number of issues and their implications to successful DE systems. These issues included, but were not limited to: data collection methods, comparative studies, media effectiveness comparisons, media choice, external evaluator, dropout rates, the need for counselling in DE, administrative support, ensuring real demand for DE prior to planning it, faculty workload, recruitment of staff and staff training, faculty perspectives to and barriers in DE.

The new educational technologies have been changing instructional practices and affecting the way instructors teach, students learn, educational institutions manage education, and managers plan education. This tremendous impact has been witnessed in institutions of higher education that are beginning to deliver instruction at a distance. However, it appears that some are "being constantly up-graded or improved, or have had to be re-designed as a result of mistakes in the early stages of development" (Bates, 1997; p. 105). Bates (1997) argues that "the promise of new technologies does not necessarily lead to open learning, nor does it guarantee that technology will be used in these ways. Without careful management and design, it can lead to a widening gap in access between rich and poor; it can lead to cultural imperialism, the ‘Americanization’ of the curriculum; it can even lead to the destruction of public education systems by powerful multinational corporations - if we let it" (p. 94). "(…) How DE programmes fit within the mission of the institution must first be determined before any major resource allocation should be expected" (Berge & Schrum, 1998; p. 33). Aoki and Pogoszewski (1998) point out that "planning and designing a virtual university or a virtual campus is a complex task involving many different aspects of higher education administration and instructional delivery. In the early days of on-line courses, just putting course syllabi on the Web was worthy of attracting some attention. Nowadays many on-line courses are offered using a combination of asynchronous and synchronous computer conferencing, slide presentation on the Web, and file transfer systems" (Aoki & Pogoszewski, 1998; on-line). Though course delivery is an important component of DE, it is not the only component. "In order to create a successful academic environment for a distance learner, various support services to students and faculty members have to be included in the plan as integral part of a virtual university". Aoki & Pogoszewski's article presents a virtual university reference model. In the model, a virtual university is broken
down into four major components: administrative services, student services, resource services, and faculty services. Each component has a different purpose and provides students with different services. Mason and Kaye (1990) suggested that "designing a DE course that uses CMC effectively, one has to assume that all students will have easy access to the necessary technology, and will know how to use it as a medium for educational communication" (p. 26). "Modern technology has overcome not only the constraints of place but also of time" (Ahern & Repman, 1994, p. 538). Often these new educational technologies are implemented without fully understanding their impact. However, one common question that must be addressed is: how will these new educational delivery systems impact students' learning? At many educational institutions, the effectiveness of DE methodologies has not been well researched prior to adoption (O'Malley & McCraw, 1999; online). "(...) Research should explore the effects of mediating technologies on specific instructional strategies [i.e. tasks] such as peer-tutoring or co-operative learning [i.e. group work], which were originally designed for face-to-face interaction (Ahern & Repman, 1994; p.544). "Even the most careful planning process does not result in one right answer" (Albrecht & Bardlesy, 1994; p.82). These authors point out that financial indicators will tend to determine whether the planning process had been successful, although this is certainly an insufficient indicator of the effectiveness of the planning process of DE. Rumble (1986) examined the importance of establishing a DE system. He argues that for planning a DE system, one should specify the underlying philosophy before, as well as make explicit the mission, goals, and objectives of the educational institution or system. "Equally, it is vital to clarify the strategies which will be used and ensure that the ways and means adopted are sufficiently robust to enable agreed goals and objectives to be achieved" (p.101). Although he makes an important contribution, this work refers to the planning of a whole new DE institution, which significantly differs from the one in the scope of this thesis.

In North America, "distance learning has also attracted criticism from members of the educational community and the public about the quality of the educational experience. As a result, accrediting bodies, higher education associations, and state education agencies - e.g. Commission on Higher Education of the Middle States Association of Colleges and Schools (1997), Interregional Committee on Distance Learning (1997), and the American Council on Education Center for Adult Learning and Educational Credentials (1996a; 1996b) - among others, have taken steps to guide and assist the higher education community in addressing it" (Dasher-Alston & Patton, 1998; p.13). "It is generally agreed that one of the key steps towards developing an effective DE programme is planning, particularly academic planning. This may entail rethinking the teaching/learning process in light of the technology being used or the method of instructional delivery" (Bates, 1995; as quoted by Dasher-Alston & Patton, 1998; p.13). "Achieving a sense of continuity and connectivity with the institution's stated educational goals and objectives is another essential component of planning" (p.14). English et al. (1998) "developed the process of planning, implementing, and evaluating a specific DE course in Pathomechanics for the professional-level Masters degree physical therapy students at a North American university. The mission was to educate health care practitioners to understand the needs of rural (...) and to increase the number of health care practitioners in rural, medically under-served areas" (p.228). When using synchronous media, such as audio/videoconferencing or computer conferencing, Gunawardena (1992) points out the importance of "preplanning and organization. Advance planning, collaborative planning, and organization were the keys to the successful operation of the conference [computer conferencing]" (p.67). Vrasidas and McIsaac (1999) advocates that teaching on-line is not as easy as it may sound, it requires detailed planning. They finally stress the need for further empirical research for structuring DE as mentioned in the previous chapter (1). Baley and Cowell (1986) as cited by Willis (1993) confirm that "a number of studies have suggested that distance delivery requires enhanced planning and management skills on the part of the faculty and support staff. This same study suggests that effective DE programme planning requires a rigorous and systematic approach to development that is more prevalent in corporate training environments than higher education settings" (p.12-13). "If the characteristics of the delivery system are important only to the extent that they are appropriate to the content being presented, what factors do determine the effectiveness of distance learning? Over the past several years, research exploring effective distance teaching efforts as well as evaluations of students' attitude towards the use of distant delivery methods has resulted in some fairly consistent conclusions. These conclusions are worth considering when planning and implementing DE programmes, (...)" (p.17). For example, teaching at a distance can be effective, and a suitable learning environment, provided that there are: timely feedback, student-to-student interaction, enhance of student motivation, foster face-to-face contact, an on-site facilitator, time put into course adaptation, advising and counselling support, technical support, hands-on training for faculty among other factors (see Willis, 1993; p.19-22). Wagner (1993) examines a number of factors that affect DE programme's success. She makes general recommendations for planning effective DE programmes. Although, "general recommendations cannot anticipate every situation which may arise in specific distance educational applications, (...) they can very effectively serve as benchmark to guide the planning, development, implementation, and evaluation of DE systems, programmes, courses, and services" (p.28). "Clearly, one must first be aware of the array of issues to be accommodated in DE system and programme planning (...)" (p.28). Wagner's
The importance of counselling in DE programmes seems to be well acknowledged in the literature (Moore, 1993; Moore & Kearsley, 1996; Daniel & Marquis, 1979; Mason & Kaye, 1990; Simerly, 1999; Willis, 1993; McIsaac & Gunawardena, 1996; and Robinson, 1981). For example, Daniel and Marquis (1979) discussed, among other issues, the importance of counselling in a DE programme. “Even for those fortunate students who achieve a harmonious equilibrium between study and day-to-day life, the counsellor has a role to play. He should be ready to guide at the recurrent choice points and to help the student who finds job satisfaction decreasing or is faced by an unforeseen event which upsets his schedule” (p.37). Mason and Kaye’s (1990) publication on a new paradigm for DE has provided a useful theoretical framework from which the conceptual frameworks of this thesis will be developed. In particular, their discussions about “the need for adequate and appropriate library access both for students and for academics”, and about “the provision of support and counselling for students” (p.24-25).

2.6.3 Involving stakeholders in the planning process of DE

The last issue in planning DE to be presented in this overview is related to the involvement of stakeholders. While a number of research efforts in the field only investigate the learners’ attitudes to DE (e.g. Bloomfield, 1997; Hara & Kling, 1999; and O'Malley & McCraw, 1999), “learners are just one of the stakeholders in the current education system. For the revolution to succeed, the needs of all stakeholders must be addressed, or they may very well remain opponents to change. Learner-centred design addresses the need for learner engagement, but other stakeholders need designs that address the issue of effectiveness and viability” (Norman & Spohre, 1996; p.27). In higher education environments, stakeholders include offices of admissions and registration, students counselling, continuing education, personnel involved with the instructional delivery and representatives from potential student populations. “Often employers must be included, even when they are not primarily sources of financial support. The planning process can thus be used as an opportunity to bring together personnel from the university with representatives of customer or client groups” (Albrecht & Bardsley, 1994; p.71). English et al. (1998) stated that “delivering a professional programme course via distance learning requires greater planning, organization, and effort on the part of the instructors and the students. Teamwork among faculty and students and communication with those
individuals who have the knowledge to assist in the implementation of the DE course is essential to an acceptable outcome" (p.232). Saba (1999d) states that “it is important to realize that students, faculty, officials, professionals, decision-makers, and others make up a complex web of activities and information flows in which distance teaching and learning takes place” (p.3). Kovel-Jarboe (1997) analysed and discussed educational policy adopting a stakeholder perspective. “This approach means that one must know who the stakeholders are and understand their assumptions and expectations; it does not assume the dominance or pre-eminence of any one group or institution. Thus it can accommodate a wide variety of viewpoints (stakes) and interests” (Kovel-Jarboe, 1990; p.23). Simerly (1999) suggest working with “key stakeholders to develop realistic estimates of the resources needed to support technology-enhanced education” (p.43). In this thesis, a number of stakeholders participated in the surveys, which therefore, provided a multiple perspective approach and allowed for triangulation as a means of strengthening the results.

2.7 Specific research questions

A number of specific research questions have emerged from this more specific literature review. The literature review indicated a need to further investigate the following categories: DE impact on students’ achievement; students and lecturers’ satisfaction with DE, students’ and lecturers’ experience with DE, the identification of the necessary factors to take into account when beginning to plan DE programmes, and the identification of their level of importance. Therefore, the following research questions are addressed:

- What kinds of issues affect the main stakeholders’ use and the attitudes towards DE technologies?
- How experience with DE relates to satisfaction with this mode of instruction?
- How to structure the early stages of planning an effective DE programme?
- "Is it possible to prioritize the variables that impact on distance learning in terms of importance?" (Goodman, p.20)

2.8 Conclusion

A number of more focused research categories about the issues in DE were identified in the literature review and thus specific research questions have emerged. As a consequence, the building of the data gathering instruments will focus on the major issues identified in this literature review for further investigation in a naturalistic fashion. The next chapter (3) will outline how the further investigation is carried out, i.e. by which means, e.g. methods. As such, the focus of the next chapter is on the research strategies and methods for the further investigation of such categories.
Chapter 3

Research Methods

3.1 Chapter outline

The literature reviewed and presented in the previous chapter led to the formulation of a specific set of research questions (chapter 2). These questions, as well as those that arose from the broad literature reviewed in the introductory chapter, are concerned with the main categories to be investigated in this thesis. After the identification of these categories, and from the nature of the determined research questions, the research methods could then be selected. Therefore, this chapter examines the appropriate research methods required for carrying out the research in this thesis. Figure 3.1 illustrates chapter 3 in relation to the overall thesis structure.

![Thesis structure diagram]

Figure 3.1: Chapter 3 in relation to overall thesis structure

A comprehensive understanding of the phenomenon Distance Education (DE) cannot be obtained without a thorough review of the relevant research methods that provide the means of studying the impact of DE on stakeholders. As a result of the determined research questions from chapters 1 and 2, the following sections will outline the research strategy adopted as well as the research methods required to undertake this study.

3.2 Research methods

An increasing number of methods for studying the impact of DE technology on stakeholders have recently become available. The choice of a research method, strategy and paradigm is not only dependent upon the researcher’s personal preferences but rather, it is heavily dependent upon the nature of the research problem statement, i.e. whether there exists a set of open-ended questions or a set of hypotheses (see table 3.1).
Table 3.1: Research methods (adapted from Perry, 1996)

<table>
<thead>
<tr>
<th>Research methods</th>
<th>Qualitative research</th>
<th>Quantitative research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature review</td>
<td>Exploratory: what are the variables involved?</td>
<td>Explanatory: what are the relationships between the variables which have been previously identified and measured?</td>
</tr>
<tr>
<td></td>
<td>Research questions are developed</td>
<td>Hypotheses are developed</td>
</tr>
<tr>
<td>Research paradigm</td>
<td>Naturalistic</td>
<td>Positivist</td>
</tr>
<tr>
<td>Methodology</td>
<td>e.g. case study, action research</td>
<td>e.g. survey, experiments</td>
</tr>
<tr>
<td>Instruments</td>
<td>e.g. interviews, observations</td>
<td>e.g. questionnaires</td>
</tr>
</tbody>
</table>

In dealing with the interaction between DE technologies and the stakeholders, one might think that traditional human factors research methods would be an appropriate means of carrying out this study. However, traditional Human-Computer Interaction (HCI, a sub component of human factors) evaluation methods are insensitive to organizational issues. They are centred on the users and do not take into account the whole community of stakeholders. They are also limited in the detection of the overall human factors issues that must be taken into account. Moreover, "traditional human factors studies have often involved controlled experimental conditions in which users interact with an interface, and performance is measured in terms of time to complete a task, number of errors, and quality of performance" (Kies, Williges & Williges, 1997; p.997). Therefore, it has become evident that the trend has changed from an individual to an organizational approach, which is the approach currently adopted in this research (table 3.2).

Table 3.2: The trend from individual to organizational

<table>
<thead>
<tr>
<th>INDIVIDUAL</th>
<th>ORGANIZATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>User-centred design/evaluation</td>
<td>Stakeholder-centred design/evaluation</td>
</tr>
<tr>
<td>Human-Computer Interaction (HCI)</td>
<td>Organization-Technology Interaction (OTI)</td>
</tr>
</tbody>
</table>

3.3 Methods appropriate to the current research

Due to the open-ended nature of the research questions, the strategy adopted in this research is to take a naturalistic approach as opposed to a traditional positivistic one (figure 3.2). This is because the naturalistic enquiry offers the means of identifying crucial contextual and environmental issues that are typically ignored by the positivistic approach, although elements of positivism are adopted whenever appropriate and necessary. For example, later, in chapter 5, there is an attempt to measure the relationship between two variables to find out how they relate to satisfaction with DE. However, the results were of little value because of the so called “no significant difference” phenomenon in research of this kind. Therefore, the research reported in this thesis adopts a series of fieldwork in its natural environment and uses the real stakeholders as a source of data, which are partly quantitative and partly qualitative. “Qualitative data were used to clarify quantitatively derived findings (Hiratsuka & Eason, 2001). The fieldwork is divided into four in-depth case studies (see figure 3.4). Likewise, each case study is divided into sub-case studies according to the research needs.
Although the aim of this section is not to describe detailed explanations of each research method, figure 3.2 shows a visual map of the different paradigms. What is really worth explaining here is that the work carried out in this thesis is of a naturalistic paradigm, but this does not mean that elements of a positivist enquire are excluded. On the contrary, as mentioned earlier, in chapter 5, there was an attempt to carry out a procedure of this kind. However, as seen in chapter 2, many researchers argue that this kind of research is not entirely ready for a positivistic approach yet. Many of the variables need to be identified and their causal relationships understood. As a result, a conceptual framework will be created following the completion of each case study to summarize the significant variables in the case. In the next figure, a preliminary model attempts to illustrate the variables of cause and effect (i.e. model input/output) to be further investigated.

**Variables of input:**
- Multimedia delivery
- Subject matter
- Course content
- Students' characteristics
- Working environment
- Study environment
- Technical support

**Output:**
- Affect on learners
- Affect on Instructors
- Affect on managers
- Affect on technicians
- Affect on the educational institution

As illustrated by figure 3.3, there are many possible causal connections. This research needs to be understood as a system's study carried out using a series of diverse case studies. These case studies need to be studied using a set of common methods to allow for cross-case studies comparison. A common or similar set of outcomes is a strong reason not only for the possibility of a certain degree of generalizations but for the identification of the factors that lead to a successful and thus an effective DE programme. In the subsequent sections, more detailed explanations of the data collection instruments, data analysis criteria, as well as data interpretation are presented. However, before presenting them, it is important to clarify some basic concepts.
3.3.1 The concept of evaluation adopted in this research

In the present context, evaluation can be defined as being: "the collection, analysis and interpretation of information about any aspect of a programme of education and training as part of a recognized process of judging its effectiveness, its efficiency and any other outcomes it may have" (Thorpe, 1988; p.5). Moreover, evaluation is an iterative process in which different methods and techniques have a variety of sensitivities that are dependent not only upon different stages of development of the DE programme (early stages or in use) but also different settings. Furthermore, despite evaluation being a process of measuring, the term "evaluation as commonly used in Human-Computer Interaction (HCI) is possibly a misnomer, since the key outcome is often qualitative rather than quantitative" (Lansdale & Ormerod, 1994; p.238).

3.3.2 The concept of usability

This is the process by which the level of usability of a system is measured. It typically involves observing users as they try out certain aspects of a product. However, in this thesis, users refer to stakeholders and product refers to DE. The term usability is defined in ISO 9241-11 as follows: "Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." This standard refers usability to a multifactorial concept related to ease of learning, easy of use, effectiveness of the system, and user satisfaction. "The usability of a computer is measured by how easily and how effectively the computer can be used by a specific set of users, given particular kinds of support, to carry out a fixed set of tasks, in a defined set of environments" (Chapanis, 1991; p.362).

Furthermore, Shackel (1991) suggested that the usability of a system or equipment is "the capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios" (Shackel & Richardson; p.24).

Basically, there are three features involved in these definitions i.e. effectiveness, efficiency and satisfaction.

- **Effectiveness of use by users:** the accuracy and completeness with which users achieve specified goals;
- **Efficiency:** the resources expended in relation to the accuracy and completeness with which the users achieve goals; and
- **Satisfaction towards the system:** the comfort and acceptability of use.

As such, data collection instruments for this research include questions for measuring usability and acceptability levels. The following section outlines the general form of case studies.

3.4 General form of case studies

The choice of case studies was dependent on the taxonomy of DE according to its means of communication (see figure 1.5, chapter 1). The intention was to choose case studies that would use diversified media and would cover, as much as possible, the full gamut of computer-based DE. As such, the three case studies selected for research cover the entire computer-based DE from the taxonomy presented in figure 1.5. Obviously, it was not only a matter of choosing them according to the research need of the taxonomy, but also, they had to agree to co-operate with the study and all the participants surveyed had to volunteer themselves. The next sections provide an account of the fieldwork procedure. Basically, the fieldwork was divided into two main parts, (1) the three case studies of existing DE applications and (2) the case study of DE being planned, which was further divided into sub-case studies.
3.4.1 Case studies of existing DE applications

The research methods that investigate those case studies in which DE is currently being used were chosen in order to most appropriately acquire a general understanding of the human issues in the delivery of DE. As such, it was decided to perform questionnaires administrations with main stakeholders, semi-structured interviews, and classroom observations (when appropriate) as a means of collecting data. The next sections outline the methodological procedure for the first three case studies.

Using multiple case studies

Some previous studies carried out in the field investigated a single case study (e.g. Mason, 1989; Tong, 1998; and Miller, 1997) but a large limitation of these studies was the inability to generalize its findings to other settings in different contexts. The reason for performing multiple case study research is mainly to increase the reliability and validity of the results. Moreover, since the final objective of this thesis is to design a guiding tool for the planning of effective DE programmes, the more different contexts and settings to be investigated the more it is understood about the general DE phenomenon, regardless of the technology used. One of the advantages of adopting multiple case studies, in terms of its practical applicability is that it increases the likelihood of its practical applicability both for decision and policy makers. Furthermore, Yin (1994) argues that the advantages are potentially enormous if a multiple-case study research is written in a question-and-answer format because the reader needs only to examine the answers to the same question for each case study to begin making cross-case comparisons. On the other hand, the disadvantage is that it can be extremely time-consuming to carry out and to write research of this kind.

Taking into account the cultural difference

The fieldwork for this research was carried out in different settings due to the importance of the diversity allowed and, therefore, the context in which DE is being employed. Despite English being the official language in these three settings: England, Northern Ireland and the USA, a cross-cultural analysis of the responses is taken into account. Specific details about some of the research methods could vary according to the culture and therefore, the attitudes of the country where the research is carried out. Nevertheless the essential nature of each technique is kept. A balanced combination of close-ended and open-ended questions is far more appropriate for the purpose of this research. The reason for that is that the aim of the data gathering methods (checklist, interview, questionnaire, document analysis, and classroom observation) was not only to learn more about how students and lecturers feel when learning and teaching at a distance, but also to evaluate their impressions of the DE course and their interaction with DE technologies. Furthermore, in the phase of data interpretation, the US community of researchers and practitioners in the humanities field may be far keener on the use of new technologies. This different attitude could also affect the outcome of the survey and should therefore be taken into consideration.

Using multiple methods

In order to take into account the nature of this survey, which is conducted in real world settings with case studies, a multiple method approach is required. Other factors that justify the use of multiple methods include the aims of each phase of the methodology that it has to be summative in order to be formative. Scriven (1983, p. 257) argues that an evaluation implies a multiple approach, advocating that the 'multimode' in which the evaluation is a "multifield which is multidisciplinary, multidimensional, multiperspectival, multilevel: (...) multiple functions, multiple impacts, multiple reporting formats - evaluation is a multiplicity of multipliers".

Reasons for evaluating usability and acceptability

An appropriate methodology for investigating DE was originally sought because the existing literature on HCI only reported methods and techniques that are more appropriate for evaluating systems interfaces, which have been shown to be limited when considering the community of stakeholders, the technology and the organization as a whole within its socio-technical context. According to Eason, Harker and Olphert (1997), two main reasons can be identified for failure in the implementation of new technologies into an organization. First the technology has to meet the business needs of the organization and, second it has to be compatible with the structure and culture of the organization. Traditional systems evaluation techniques are not sensitive enough to these issues. Schniederman (1998) argues that design and particularly evaluation should be based also on acceptance tests, not only on usability tests.
with prototypes. Therefore, the questionnaires for this thesis were based not only on usability but also on acceptability aspects.

Additionally, focus groups could also be conducted as suggested by the relevant literature (e.g. Shneiderman, 1998; Benyon, and Stone & Woodroffe, 1997). Focus-group discussions are valuable in ascertaining the universality of comments (Shneiderman, 1998; p.145). Nonetheless, focus groups were not used in the current research because it can be argued that individual interviews enable a richer set of data and minimize cross-influence between interviewees. The next sections outline the specific procedures for conducting the case studies.

**Looking for opportunities**

In this initial phase, the evaluator seeks opportunities that suit her strategy and plan of intentions. This plan is outlined and detailed in accordance with the purpose of the evaluation. This phase gets started by either finding reports or articles in which an experience with DE is reported or presented by a certain institution or contacting people related to DE who can be either co-operative or suggest others for contact via e-mail, telephone or office visits. Performing three case studies in countries where the evaluator had no previous contact was not only a challenge but time-consuming because there was a need to acquire permission from the institution to perform these kinds of studies.

*Document analysis:* Whenever reports and articles are available, it is possible to establish the first contact with the person in charge of the DE programme in a particular institution or the author of the report or article. This gave the evaluator an opportunity to learn more about the DE programme in the institution of case study B and, therefore, know before hand whether such a setting would be a feasible context to conduct the study. Moreover, this provided the evaluator with the ability to write a contract in which the general intentions of the evaluation were outlined in a clear and non-threatening way.

*Building a network of relevant contacts:* Another way of getting started is to build a network of people involved with DE so that relevant contact can be established. This provided the evaluator with an opportunity to meet with people that were not necessarily directly related to DE but who were at least willing to listen to her intentions, to understand the importance of the study and, therefore, to co-operate by suggesting relevant contacts. This phase was time-consuming but essential to the success of finding opportunities.

**Agreement and negotiation**

*Presenting the contract:* Once the opportunity was found, a negotiation was established to ensure that both parties, the evaluator and the person of contact (co-ordinators, managers, lecturers, or professors) agree with cooperating with the study (e.g. being a volunteer for surveys). In this phase, a contract written by the evaluator was presented. This contract contained an outline of the general intentions of the study and was written in a clear and non-threatening way. In the contract it was included how the evaluation process works, a summary of the survey instruments (interviews, questionnaires, observations) and the possible duration of the meetings and interviews. It was also important to present the main purpose of the questionnaire and what its sections were about, which also applied to the interviews. Usually the aim of the contract is to ask for permission to conduct the study and therefore survey the stakeholders, videotape the classroom, access computer-based material and protected Web sites, etc. That is why it was important to ask questions about the people involved in the current DE programme (e.g. stakeholders).

*Ethics in evaluation:* It was also in the first meeting that the evaluator made clear that the ethics of the conduct was ensured, understood and agreed by the person of contact. This especially involves confidentiality concerns. The evaluator therefore made clear that the responses were going to be used only for the purpose of this survey and that the identity of the respondents would be kept anonymous. This was a critical and delicate matter and demanded careful conduct by the evaluator. Additionally, evaluators should be aware of the ethical problems in order to have proper conduct. According to House (1997, p.258) a review of the literature suggests four basic ethical problems: (a) withholding the nature of the evaluation research from participants or involving them without their knowledge; (b) exposing participants to acts which would harm them or diminish their self-esteem; (c) invading the privacy of participants; and (e) withholding benefits from participants. These are all intrusions against an individual’s person or infringements against personal rights. For further reading on this subject, see House (1997).

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31 The evaluator in this research was the author, who was external to all case studies. This provided a number of advantages including avoidance of bias.
Using checklist/interview protocol: In order to ensure that all the items of this phase were not forgotten, a checklist of the interview including all the necessary topics of the conversation for the first meeting was helpful. It was also convenient to ask questions about who was (were) the sponsor(s) of the DE programme, what sort of technology was being used and more specific questions that completed the evaluator’s general understanding of the DE programme in this particular institution. The overall aim of the checklist was to ensure that all the necessary information to design the instruments was being collected.

**Identifying the stakeholders:** It was also during the first meeting that the evaluator was able to obtain information about the stakeholders. This was particularly important to the next phase, which is the conduction of the survey.

**Conducting a survey**

Once the person of contact had agreed to the contract, all the necessary information was collected, and the community of stakeholders identified, it was possible to start the survey. The first action was to design the appropriate instruments of this survey. The design of the first version of the questionnaires needed to be piloted before actual use in the survey in order to ensure that the questions are properly answered.

**Data gathering:** When the survey started, the first action was to gather data. As the nature of this survey was both inductive and deductive, the aim of the evaluation was also both formative and summative. Multi-methods and techniques were employed. Wolf (1997, p.423) argues that a decision about an appropriate method of data gathering is dependent upon three main factors: (a) the nature of the variables to be studied; (b) the nature of the target population that is to be studied and (c) the amount of resources available for the investigation.

**Interviewing:** Interviews are frequently employed as a means of obtaining information but is usually supplemented by written reports and complemented by questionnaires because people typically feel more comfortable to talk about certain aspects rather than having to write about them in a questionnaire form. Keats (1997, p.307) argues that an effective structured interview has three main phases. The interview begins with an introductory phase in which the credentials of the interviewer are presented. In the second phase, the main content of the interview is developed. Then, in the third and final phase, the interviewer concludes the interview. In the first phase, the basic, non-threatening background information is presented. In the second phase, the content is addressed followed by a more detailed exploration. In the third phase, courteous thanks for the efforts and time spent may be sufficient, however, in cases where stress and anxiety have been aroused, it is important to make sure to leave the respondent in a satisfied state of mind. Even though an interview is a controlled conversation in which the interviewer obtains information from the respondents, the approach used in this research was a rather informal technique. The informality of the interaction between interviewer and respondents was an important aspect since spontaneity from both parts leads to a more comfortable experience. For this reason the interviews were semi-structured in their nature. The mode of interaction was essentially verbal, but non-verbal messages were also detected and needed interpreting along with the verbal elements of the interaction. The format of the questions were predominantly open-ended, in order to provide the respondents with more flexibility to talk about things that were not directly related to the question but may have been relevant just because they were what the respondent wanted to add. This was the essence of the semi-structured interview. It is argued that the interviews should not be tape-recorded due to its effect on the spontaneity of the respondent, nevertheless, raw field notes were taken to ensure that the relevant information was not missed. Another factor that contributed to get most of the respondents’ spontaneity was that the interview was conducted in their working environment, their offices. This did not only make the respondents more comfortable but also, gave the interviewer the opportunity to get further clues on the respondents’ attitudes.

**Document analysis (reports, articles):** Another way of collecting information is by carrying out a literature review that focuses on the experience from other researchers and practitioners. This was helpful because it did not replace the findings of this survey. Moreover, it not only allowed comparisons with other researcher’s findings, but also learning more about how other researchers and practitioners, from other areas, conducted their surveys. In case study B, an evaluation from an educational point of view had already been performed in the institution (i.e University) of the survey, hence it was very important to analyse the report about such evaluation. The findings from other researchers and practitioners complemented this study since they were relevant to this thesis survey. However, the approaches and the specific purposes were rather different so that it did not replace nor did it invalidate this thesis study. Rather, the advantage was to get to know researchers and practitioners that had done similar evaluations but not from an ergonomic/human factors point of view so that experience was changed. It was quite clear that the
different approaches, from an educational point of view and from an ergonomic/human factors point of view should be seen as a complement to one another towards the success of an effective DE programme.

**Classroom observation:** Videotaping is, nowadays, widely used in order to enable a subsequent analysis under a less pressurized circumstance than that under the condition of a live recording. Likewise the other instruments of data gathering, observation, can also be structured, but what is being argued is a more informal approach. In this research, an unstructured observation was sufficient when considering the multiple purpose of it. On the other hand, whenever an observation is in a controlled setting, for instance, a usability lab, the procedure is totally different and a structured observation is then required.

In contrast, in a real world setting, for instance in a videoconferencing lecture room, the approach was rather informal, which helped to transmit a more relaxed feeling to the students and to the lecturer. This may have also caused less interference on the spontaneity of the students and the lecturer. Furthermore, the totally structured kind of observation may have limited the freedom of the observer to detect unpredictable details and behaviours. Thus the main aim of the videoconferencing lecture room observation, in this phase, was to detect behaviours, to understand the context and the environment in which videoconferencing was being used, and to understand how the students and lecturers feel when learning and teaching via videoconferencing. This was particularly important when formulating a close-ended set of questions and rating scales concerned with the videoconferenced way of learning and teaching. Raw field notes were also used as a means of registering the data gathered during the observation.

**Administering questionnaires at the end of the interviews**

Data collection instruments for this study were divided into two major groups: semi-structured interviews and postal questionnaires. The design of the questionnaire was slightly different for each stakeholder surveyed. Basically, these included the lecturers, the students, the managers, and technicians. The questionnaires were not designed from scratch because the literature reviewed and outlined in the previous chapter had already provided the means for identifying a questionnaire designed for the purpose of measuring the interface between the diverse DE technologies and the user (Shneiderman, 1998). Naturally, this questionnaire had to undergo adaptations in order to be appropriate for the three case studies. The questionnaires were mainly designed by the author of this thesis and a few more items were added, when applicable, from Shneiderman’s questionnaires. The main reason for choosing Schneiderman’s questionnaire was the fact that it is probably the most properly designed to measure the usability of the DE technologies and therefore, fitting the purpose of this thesis. Whereas in case study D (chapter 8) the questionnaire was entirely based on the frameworks previously designed and presented in chapter 7.

Another point that deserves explanation is the evaluative nature of the first three case studies (A, B, and C). Traditional evaluative criteria for DE is described in the Commission on Higher Education of the Middle States Association of Colleges and Schools’ report (1997), in the Interregional Committee on Distance Learning’s report (1997), and in the American Council on Education Center for Adult Learning and Educational Credentials’ report (1996a; 1996b). “Evaluation, as described in the evaluation literature, is an attempt to determine the worth quality, or value of something. It can be done for the purpose of improvement (often called formative evaluation) or to describe the final outcome (often called summative evaluation)” (Coldeway, 1988; p.49). Coldeway argues that “evaluation can be quantitative or qualitative (usually both)” (p.49). As such, evaluation offers the ability to judge the quality of a DE programme and quality in this context is directly related to the effectiveness as explained in chapter 2. Hence, evaluative case studies were the approach chosen for carrying out case studies A, B, and C. This evaluative purpose strongly influenced the design of the questionnaires. For example, the questionnaires aimed at finding out the stakeholders’ attitudes and reactions towards DE technologies and mode of delivery. The fact that the research design involves stakeholders rather than a single community of users (e.g. students) and the multiple-case study approach allows for the investigation of different modes of delivery (media) are further advantageous features that increase the likelihood for generalization of findings, and thus ecological validity. Therefore, the questionnaires were basically divided into four sections.

The list of what can be included in a questionnaire can be quite varied and is nearly unlimited. What is included is therefore limited by the purposes of the survey, by what can conveniently be asked, and by time constraints. Investigators, evaluators and surveyors often find it difficult to explore fully all variables of interest without making the questionnaire so long as to substantially reduce the likelihood that the respondents will be willing to co-operate. Another constraint to be taken into account is argued by Wolf (1997, p.422) - "It is clear that asking highly personal questions can produce problems in a questionnaire". The third constraint is time as mentioned before. "The respondents cannot be expected to spend a great deal of time answering a questionnaire". According to Wolf
questionnaires administered to students may need to be shorter and require less time than the one administered to lecturers, tutors, technicians, co-ordinators and project leaders. Nevertheless this is dependent upon the age of the students. If they are adults and thus mature students, the difference in time should not be of concern and is due to their individual willingness to co-operate and that was the case.

An unstructured or semi-structured questionnaire is normally divided into sections. A typical first section is the personal data section, which is optional to the respondents. Some researchers and practitioners argue that this section should not be even included in the questionnaire however, the fact that it is optional is a rather democratic one. The reason is that, when the identity of the respondents is known, it is much easier to apply a follow-up procedure to urge non-respondents to reply. However, it is still strongly advisable to keep all identifying data, such as names, e-mail addresses, telephone numbers and addresses of the respondents in a separate file from files containing the other data collected from the respondents. Therefore, the questionnaire was divided into the following sections:

- **Section I: Personal data**

  In section I, questions were about the identification of the volunteer. They were presented to be optional to the volunteer so that they could be registered as being anonymous.

- **Section II: General data**

  In section II, questions were about the characteristics of the volunteer. These were characteristics that were thought to be relevant to the investigation, such as age group, gender, in case of student whether they were working or not, studying part-time or not, whether there was previous experience with DE and for how long, reason for learning or teaching at a distance, and expectations of DE.

- **Section III: Usability**

  In this section, the questions aimed at finding out the level of usability of the DE technology which differs from case to case. It is in this section that part of Schneiderman’s questionnaire was included and presented in a 5-point Likert scale format.

- **Section IV: Acceptability**

  In this section, the questions were aimed at measuring the level of acceptability of the DE course, and use of technology during the course. This included, level of satisfaction, whether or not they would teach or learn at a distance again, level of effectiveness of DE for specific tasks, and whether or not there were further comments or issues that should be addressed.

*Data analysis:* The data collection procedure outlined above has its own inherent weaknesses. However, the use of multiple case studies, as well as the use of a common set of diverse data collection methods for each case study, allows for reducing them. This is because of the perfect condition for triangulation. By using triangulation, the data collected could be contrasted, evidence enhanced, as well as a greater understanding of the phenomenon under study being achieved (Lincon & Guba, 1985). In this research, triangulation was not only methodological, but also data triangulation according to Denzin’s (1978) typology. In the next section, the procedure for conducting case study D is outlined.
3.4.2 The DE planning case study

After conducting three comprehensive case studies, the results were compared and contrasted so that conceptual models of DE could be developed for each case study. Furthermore, having strong evidence from the cross-case study analysis (chapter 7) allowed for the construction of frameworks and models for the planning of effective DE. In order to test the reliability of these frameworks and update them, a fourth case study had to be performed. But this time, the case study investigated not the delivery of existing DE programmes but the planning of it.

*Data collection methods:* For this case study, data was gathered by conducting semi-structured interviews with members of staff. The members of staff were selected on a basis that they were currently planning their DE programmes at the time of this survey. All interviews were individual and face-to-face with each staff member. Each interview was tape recorded and transcribed to allow for posterior in-depth data analysis. This was a quite time-consuming and laborious phase, however, absolutely helpful in acquiring a more in-depth understanding. Questionnaire for this case study was entirely designed by the author of this thesis and it was strictly based on the frameworks presented in chapter 7. Therefore, the questionnaire was well structured with a range of 5-point Likert scales to allow for easy data analysis and administered at the end of each interview.

*Data analysis:* The data analysis followed the procedures of the previous case studies but a more in-depth approach was used with the interview data. Chapter 8 outlines an account of this case study and several interview excerpts were incorporated to illustrate the study. As far as questionnaire data is concerned, the analysis was straightforward and illustrated by charts which showed the level of importance of each variable (chapter 8). The results of these data analyses allowed for testing the reliability and updating the frameworks.

3.5 List of case studies

In this section the list of case studies is outlined, see table 3.3.

**Table 3.3: List of case studies**

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<tr>
<th>List of case studies</th>
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<tbody>
<tr>
<td><strong>1. DE in use:</strong></td>
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<tr>
<td>Case study A:</td>
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<tr>
<td>The evaluation of IT on-line training</td>
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<tr>
<td>Case study B:</td>
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<tr>
<td>The evaluation of DE via videoconferencing</td>
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<td>Case study C:</td>
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<td>The evaluation of DE through multiple technologies</td>
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This chapter concludes with a diagram in which these case studies are shown in relation to the overall research model, see figure 3.4.
3.6 Research Model

Part I: Background

1. Introduction
- Providing background information
- Building a taxonomy of multimedia applications
- Providing a broad literature review
- Building a taxonomy of DE
- Provide the context of research
- Specifying field of research
- Providing the research gap
- Objectives of research
- Justification for the research
- Research questions
- Structure of Thesis

2. Research in Distance Education
- Providing specific literature review
- Supporting research with literature
- Providing earlier research on effectiveness
- Providing earlier research on issues in DE
- Providing earlier research on planning DE
- Building major categories for in-depth investigation

Part II: Methodology

3. Research methods in DE
- Earlier research methods used in the field
- Research methods adopted
- Building research instruments

4. Case study A
The evaluation of IT online training
- Piloting data gathering instruments
- Data collection
- Data analysis
- Data reduction:
- Building a conceptual framework

5. Case study B
The evaluation of DE via videoconferencing
- Data collection
- Data analysis
- Data reduction:
- Building a conceptual framework

6. Case study C
The evaluation of DE through multiple technologies
- Data collection
- Data analysis
- Data reduction:
- Building a conceptual framework

Part III: Fieldwork

7. Towards the development of conceptual frameworks and models for planning effective distance education
- Cross-case study analysis
- Building socio-technical conceptual models of DE delivery
- Building conceptual frameworks and models for planning effective DE

8. Case study E: Important issues in planning effective distance education
- Building data collection instruments: interview protocol and Likert-type questionnaire
- Data analysis - Testing the reliability of the frameworks for planning effective DE
- Level of importance of issues in planning effective DE
- Updating frameworks for planning effective DE

Part IV: Conclusions

9. Discussion & Conclusion
- Lessons learned
- Recommendations for future research

Figure 3.4: Research model
Chapter 4

The Evaluation of IT On-line Training - Case Study A

4.1 Chapter outline

This chapter describes a case study on on-line training at a distance. To present this case study, a description of the context in which the type of on-line training by DE used is outlined. Secondly, the methodology adopted for this study is described. Thirdly, the analysis of the tutors and learners’ responses to on-line teaching and learning at a distance are presented. Finally, a conceptual framework is suggested as an attempt to explain the results of this study. Figure 4.1.a illustrates chapter 4 in relation to the overall thesis structure.

The local College provided a good opportunity to gain awareness of this means of DE delivery as well as to learn more about how tutors and learners feel when they are teaching and learning at a distance. Figure 4.1.b illustrates the taxonomy of DE according to its means of communication (chapter 1) in which the shaded box indicates the kind of DE under investigation.

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4.1 In this chapter (4), lecturers will be referred as tutors and students as being learners because they were all professional people.
4.2 Description of the context

A brief description of the DE programme of the College, found in its brochure and on its Web page, reported the following:

- Courses of the DE programme of the College were designed for individuals who: are unable to attend campus classes on a regular basis; prefer the flexibility of on-line learning at a distance; or would like to take a course at their convenience, own pace, workplace or at home.
- Students who are usually successful in DE courses are those who enjoy learning independently, are highly motivated, and possess good study skills, such as self-discipline.
- The local College provides high quality training, consultancy and business support to local companies that enables them to compete in today's competitive business world.
- The College also provides continuous updating of knowledge, skills and expertise to maximize employee potential.
- By working in partnership with organizations to promote lifelong learning its aim is to give a competitive advantage to its clients. Programmes can be designed to suit learners' specific requirements.

For this research, the IT training course at a distance, delivered by the College server, was taken as the first study. The College plays the role of the provider of the IT training course, while its clients have access to the College server. Learners are issued with an individual user ID and password which gives access to the learning packages from any computer linked to the Internet. Whenever it is necessary, learners have their computer-based materials (CBMs) installed in a server computer provided by the College and located at the learner's workplace, but not always at their own desktop computers.

The DE programme at the College has a number of local organizations as its clients. Four of these were visited to conduct interviews and administer questionnaires to their members of staff who were the learners of the IT training course. They were, (sub-case study A1) Local Council, Leicestershire, (sub-case study A2) Telecommunications company, Leicestershire, (sub-case study A3) Publishing company, Leicestershire, (sub-case study A4) Local Leisure Centre. Figure 4.2 illustrates the delivery structure.
The IT training course includes a variety of modules: *Word, Excel, Access,* and *PowerPoint* for a variety of expertise levels. To design the pilot questionnaires and plan the interviews, two of these modules were briefly analysed (*Microsoft Word 97 Expert User* and *Microsoft PowerPoint 97 Beginners*) and a checklist was used for gathering more general information. The College is not responsible for the development of these computer-based materials (CBMs); a North American company is responsible for their development, commercialization and support. This company is well known as the world's largest provider of technology-based training, and the College has the right to deliver this material due to the annual licence fee paid to this company. This DE initiative would not have been possible without a grant from the European Community (EC) and the local College who partially sponsors this programme. The CBM analysed does not make use of a multimedia interface nor videoconferencing devices though it has hypertext features, which include: a navigational tool, basic commands (i.e. Print screen, Note pad, Menu, Help and Exit) and a visually synchronized way of showing the individual learner's progress.

### 4.3 Methodology adopted

**4.3.1 Specific aims of case study A**

In this case study, the specific aims are:

- To gain an understanding of the responses from the stakeholders (i.e. tutors, students, local College and the project leader) to the effects of the on-line training programme (i.e. the modules);
- To identify the human factors issues derived from the on-line programme;
- To refine the data collection methods (i.e. questionnaires);
- To build a conceptual framework based upon the analysis of the results.
4.3.2 Data collection methods

In order to achieve such specific aims, three data collection methods were used: semi-structured interviews, checklist and semi-structured questionnaires:

Computer-based material (CBM) analysis

Microsoft Word 97 for Expert User and Microsoft PowerPoint 97 for Beginners were analysed in order to understand their functionality. Lessons learned from this analysis provided the background data and the basis for the questionnaire design.

Semi-structured interview

The first meeting was with the project leader of the on-line programme at the local College. A checklist was used to assure that no important aspect of the conversation would be missed. The intention was to gain a general awareness of the programme and to discuss the procedures of the survey. Confidentiality concerns were negotiated. Permission to survey tutors and learners was given on condition that the respondents' identity would be kept anonymous. The conversation with the project leader was an informal semi-structured interview. The specific aims of the checklist are described in the next section. The project leader was visited several times so that the questionnaire design could be discussed. The interview with tutors took place at the local College after the "on-line tutor's meeting" where tutors had a chance to meet one another for discussing their strategies, reporting their experience, difficulties and progress. A non-threatening discourse was used to encourage them to express their feelings. The interview with the learners took place at their natural working environment (i.e. the four local organizations visited). They were interviewed individually so that they could feel more comfortable to express their feelings and difficulties when learning at a distance.

Checklist

The checklist included three main aspects: the current on-line system(s), the stakeholders, and the environment.

- Current system(s): subject matter of the system (i.e. IT modules) and the sponsor (i.e. the North American company);
- Stakeholders (i.e. tutors, learners, clients, the College and the sponsor): their initial requirements, interests and main issues;
- Environment: this refers to the resources available and to the main sponsor of the DE programme at the local College (i.e. the EC).

Semi-structured questionnaire

There were two different versions of the questionnaire: the tutors' questionnaire (appendix A-I) and the learners' questionnaire (appendix A-II). They both aimed to acquire the same set of data:

- Personal data: questions about the tutors and learners' personal data (i.e. age group, gender, and etc.) aimed to acquire a general understanding of their background.
- General data: questions about the general data were asked to complete the data gathering on the tutors and learners' background (i.e. level of experience with computers, level of expertise with IT, and etc).
- Usability: questions about the usability aimed to detect the learners' usability issues when using the CBM for the IT training and their reactions to it. Another aim was to determine their level of satisfaction since this is, by definition, one of the usability measures.
- Acceptability: the aim of the questions about the acceptability was to determine to what extent the learners accept this form of training, delivery, and etc.

Four local organizations were visited and there was no difference in the questionnaires administered for each sub-case study (the local organizations).
4.3.3 Procedures

There are different ways of approaching people or organizations that deal with DE either as deliverers, clients or project leaders. The local College was approached through the project leader of the DE programme for Information Technology (IT) training. Several meetings were arranged to discuss this survey. Moreover, there were two sessions of CBM analysis that took place at the College laboratory. The awareness gained by analysing the CBMs was one of the means of gathering information to support the design of the questionnaires. The other means of gathering information for the design of the questionnaires were interviews and a checklist with the project leader.

Having gathered an understanding of the context in which the learners and tutors were learning and teaching on-line and the CBM used, the questionnaire could be designed. Having designed the questionnaires for both learners and tutors, they were discussed with the project leader. The project leader suggested a few amendments so that the questionnaires could be piloted and then administered to the volunteers.

4.3.4 Sample

There were ten volunteers, three tutors and seven students that represented an appropriate sample of the DE programme of the College's population. The sample of tutors (three) represented 50% of the total population of tutors within the DE programme of the local College. Twenty-four staff members from the local organizations were enrolled as students on the DE programme. The sample of students represented over one third of the staff members taking the course. Even though both tutors and learners' samples were small, they were sufficient and helpful for this case study.

4.4 Description of the tutors' responses

4.4.1 Tutors' background

The tutors were female and in their thirties and forties. They did not necessarily have a degree, but a teaching qualification and experience with the use of IT. Two were experienced, one with teaching at a distance and the other traditionally. The third was a beginner and showed great enthusiasm for this new way of teaching. The one with the greatest experience with a traditional way of teaching made sure to highlight, during the interview, that 'distance education was no better than traditional education, just different'.

Reasons for on-line teaching at a distance

Tutors based their reasons for teaching at a distance on the learners' needs. Two out of three tutors mentioned the flexibility it offers to learners. In that sense learners can learn at their own workplace or at home, at their own pace and when it is most convenient to them. Other comments highlighted DE being open to elderly people, people with no formal entrance requirements, that IT training at a distance provided a "hands on" skill which is very appropriate for IT training, and that it provided the opportunity for the tutor to meet individual students' needs.

4.4.2 Usage of the on-line training system

Tutors' task

Tutors did not have to prepare the computer-based material (CBM), since it was developed by a North American company. However, they spent time on the preparation of the paper-based material like 'help sheets'. They prepared the 'help sheets' once and then used them throughout the course, without having to prepare them on a regular basis. The assessment of each learner's performance is performed electronically by the CBM. Each time the learners complete a specified set of tasks, he/she is encouraged to log in to the assessment module. This functionality of the system allows for the tutors to concentrate on the teaching process rather than on evaluating the learners' performance in terms of their scores since this is done by the system. Tutors have access to each learner's score which is stored on a server at the College.
The tutor's role

When the tutors were asked to report their role as an on-line tutor of DE, their comments were that they act as a "supportive" tutor (reported by two tutors) and another one reported that she had "to be more creative and flexible". It appears that there is no reason for being creative because tutors are not responsible for the development of the CBM. Perhaps what she meant by being creative was that she was able to use more creativity for the handouts 'help sheets' to bridge the gap between the CBM and the students' needs.

Contact with learners

When tutors were asked to report the frequency of contact with learners, the answers varied. A set of options with different answers was available: (a) "never", (b) "twice per month", (c) "every week", (d) "every three days" and (e) "nearly every day". Having completed this survey, the aim of the DE programme at the College was that every tutor should have contact with their students at least once a week. This recommendation was established to help to keep the students motivated, supported and as an encouragement for their individual progress.

4.4.3 Tutors' preferences (traditional education or DE)

When tutors were asked to choose between traditional education and DE for the same training and same curriculum, the overall response was DE. However, their comments were diverse: (1) "distance education is fine, it is different and gives a variety in my job in terms of how I teach"; (2) "distance education is adequate, but you have to be self motivated and disciplined" and (3) "distance education is fine for people already at work". Note that this last comment shows that the tutor was more concerned with the fact that DE enables the College to reach a wider audience by providing flexibility to professionals who normally would not enrol in a traditional setting. Therefore, this was not an expression of her feelings about teaching traditionally or at a distance. Nevertheless the overall responses demonstrate that the tutors' preference was DE.

4.4.4 Meeting tutors' expectations

The overall response to the question whether their expectations from on-line teaching at a distance were met was positive. The respondents were having their expectations met and their comments were: (1) "DE gives me a wider experience that will help with future developments", (2) "It provides a completely new experience for me and has opened other opportunities" and (3) "It gave me an insight into a new way of teaching". In the next section, an outline of the context in which the learners were taking the IT training is described.

4.5 The sub-case studies: The local organizations

A brief description of each of the local organizations and their involvement with the DE programme at the local College is given below to provide a context for the presentation of the results of the survey with the learners.

4.5.1 Sub-case study A1: Local council

At the local council, Leicestershire, its members of staff had taken the IT training for twelve months. The age group and occupation of the staff varied. There were thirteen members of staff taking this IT training at the time of this survey. Initially, the College installed one computer in a lecture room that would provide the access from the College server. However, at the time of the visit, the computer did not have access to the College server. To overcome this problem, the College provided a CD-ROM with the Computer-Based Material (CBM) which was installed on-site. This had implications for its staff, which are outlined in the analysis of the learners' responses (section 4.6). As was mentioned previously, the IT training includes four different basic modules that vary according to the different levels of expertise (Word, Excel, Access and PowerPoint). These modules had been taken by the local council staff according to each individual's needs and levels of expertise. Three members of staff were interviewed and questionnaires administered. The volunteers were willing to express their feelings about the overall training, not only their problems and issues but also their positive attitudes towards the DE programme in general and the IT training in particular (section 4.6).
4.5.2 Sub-case study A2: Telecommunications company

The telecommunications company has been established since 1986 as: consultants, suppliers, installers and maintainers of telecommunication equipment. This company is the main area dealer for Panasonic, Goldstar, Lucient and Nitsuko Digital Telecommunication Systems. Their list of customers includes, for example: Rolls Royce, Boots, and Nottinghamshire County Council. There were only two members of staff taking the IT training at the time of this survey. Of the two members of staff, one expressed willingness to co-operate during the meeting. This respondent reported that "they would start using videoconferencing in the near future". It was believed that this would enhance the interaction with the tutor. Even though, the College did not provide a computer for its two learners, they were using a computer on-site for the training, which had a network connection with the College server through the Internet. One of the problems reported was that having one computer available for the training of two learners was sufficient but nevertheless, the fact that this computer was not provided by the College meant that it was also available for other members who could use it for other purposes other than the training. In other words, this computer was not always available to the learners when they would like to use it for the training.

4.5.3 Sub-case study A3: Publishing company

The publishing company case was unusual because it was approached in its last days. This publishing company, after nearly a century of existence, was being closed. This caused a tremendous impact on its staff. About two hundred people were losing their jobs. Other members of staff had their amount of work duplicated, as a result of increased workload. There were eight learners enrolled in the DE programme who could not spend enough time on the training. During one of the interviews, it was commented that 'when members of staff got to know that the company was closing, possibly, many more people had enrolled in this training'. There were two volunteers for the interview and the questionnaire administration. Findings are reported in section 4.6.

The College had supplied two computers to be on-site; nevertheless one of the staff interviewed was taking the training from home through Internet connection to the College server. Although the company was being closed, 'because of its inability to generate profit', IT equipment (i.e. computers) had been provided to each member of staff two or three years before this survey.

4.5.4 Sub-case study A4: Local leisure centre

The local leisure centre is a sport and health centre, which offers a wide range of leisure activities to the local community at an affordable cost. People of all ages are welcome since there are a variety of activities for children as well as adults and elderly people. In order to manage all these activities, organize timetables and other office tasks, the leisure centre employs a number of staff who manage the work using computers. Nevertheless, there was only one learner taking the IT training and therefore he/she was the only volunteer to co-operate with this survey. The reason for having only one learner taking the IT training was that the College 'had offered this training as a pilot' (reported by the respondent during the interview). Aggregate findings about the analysis of the responses given by the learners are reported in the next section (4.6).

4.6 Analysis of the learners' responses

In this section the responses of the seven learners are reported. Firstly, their background is outlined to provide their profile. Secondly, their responses to the usage of the CBM are presented. Thirdly, the results of the usability and acceptability evaluations of the DE programme by the learners are investigated.

4.6.1 Learners' background

Learners of the IT training of the DE programme at the College were diverse. They varied according to their age group, occupation, gender and level of experience with computers and expertise with IT (table 4.1). However, one in seven was British Asian, while the others were all white/Anglos. The IT training was their first distance learning experience. On the other hand, their level of experience with computers varied as well as their level of expertise with IT. One of the seven respondents had been using a computer for more than nine years. Four had been using computers for about six years and three had been using them for less then three years. As a result, their level of
familiarity with the Internet also varied. Of the seven respondents, three had been using the Internet for less then three years, while the others were not using it at all.

**Table 4.1: Number of respondents and their level of expertise with IT in each local organization**

<table>
<thead>
<tr>
<th>Local organizations</th>
<th>Sub-case A1: Local council</th>
<th>Sub-case A2: Telecommunications company</th>
<th>Sub-case A3: Publishing company</th>
<th>Sub-case A4: Local leisure centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Level of expertise</td>
<td>Beginners</td>
<td>Intermediate</td>
<td>Beginner Advanced</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Age group</td>
<td>51-60 (1 learner)</td>
<td>41-50</td>
<td>31-40 (1 learner)</td>
<td>41-50</td>
</tr>
<tr>
<td>Gender</td>
<td>Females</td>
<td>Female</td>
<td>Males</td>
<td>Female</td>
</tr>
<tr>
<td>Occupation</td>
<td>Solicitor</td>
<td>Secretary</td>
<td>Caretaker</td>
<td>Site administrator</td>
</tr>
<tr>
<td></td>
<td>Legal assistant</td>
<td></td>
<td>Project manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administrative assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Learners' expectations**

A number of answers were given to the question about the learners' expectations. They were all academic related. They were categorized into the following: (a) to gain a formal qualification, (b) to improve IT skills, and (c) to become more computer literate.

**Reasons for taking an on-line IT training at a distance**

The reasons for taking the training also varied. The responses could be classified into four categories: (a) to gain a formal qualification, (b) advice from the boss, (c) to improve IT skills and (d) to mentor the others taking the training. Most of them had been taking the training for approximately one year, however, their level of expertise varied. Five in seven had never taken any IT training before and four in seven had never taken computer-based training before.

**The positive aspects and benefits**

The comments were similar to the ones given as an argument for taking the training at a distance. Nevertheless, the comments were more complete and they fell into six categories:

(a) Flexibility: learners were professional people with other commitments. Having access to a flexible training was therefore the only way they could learn and improve their IT skills.  

(b) Being able to learn at their own work-desk: there were some learners who could not leave their workplace to get access to another computer with access to the College server due to the kind of work (i.e. the receptionist lady who has to be available to the community at her front desk). For this kind of job, being able to learn at their own work-desk was considered to be a very positive aspect by this specific learner under her specific working conditions.  

(c) No need to attend evening classes elsewhere: one of the learners mentioned this benefit because he/she had other commitments at home during the evening so that attendance at evening classes would not suit his/her needs.  

(d) Convenience: this was another positive aspect mentioned by the learners. The fact that the IT training was on-line and at a distance provided more flexibility for them to learn at their own convenience.  

(e) Not having to travel: this was another benefit of the on-line training at a distance for professional learners.  

(f) Being able to learn at their own pace: provided the flexibility, being able to learn at their own pace was an important ingredient to meet the needs of the working learners.
4.6.2 Usage of the CBM for the IT training

The learners' role

The answers to the question about the learners' role could fall into three categories: (a) to be more independent, (b) to be more self-disciplined and (c) to work twice as hard. These comments were particularly helpful when the questionnaires were being re-designed. A closed-ended question could be formulated based not only on these comments but also on the taxonomy developed previously and presented in chapter 1. This question required further explanation by the evaluator during the occasion of the questionnaire administration. Even then, the answers were not very appropriate, this meant that few respondents had actually understood this question and therefore it had to be reformulated for the subsequent questionnaire version.

Learners' specific problems with learning at a distance

The answers to this question were related to the CBM rather than the DE itself. In other words, the problems that the respondents reported were about the use of and interaction with the CBM. These problems were reported by five of the seven respondents. One of them did not have any problems and the other one did not answer this question. From the five comments, three categories could be detected: (a) lack of basic knowledge which makes the process of learning at a distance more difficult, (b) CBM was not sufficiently stimulating and (c) several "bugs" were found on the CBM. The general outcome of this question could be interpreted as all complaints and critiques being about the CBM and not about the DE programme itself. This might be attributed to the fact that the learners were satisfied with the DE programme but the CBM could be improved.

Learners' method of contact with tutor

The main method of contact with tutors was the telephone. At this point, they were not using videoconferencing or WebBoard, and e-mail was used by only one of the seven respondents. They were asked to report on the frequency with which they used the telephone to contact the tutor during the training.

Table 4.2: Frequency of contact with tutor

<table>
<thead>
<tr>
<th>Number of learners</th>
<th>Frequency of contact with tutor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Every three days</td>
</tr>
<tr>
<td>1</td>
<td>Twice per month</td>
</tr>
<tr>
<td>3</td>
<td>Once per month</td>
</tr>
<tr>
<td>1</td>
<td>Once or twice in one year</td>
</tr>
<tr>
<td>1</td>
<td>No data</td>
</tr>
</tbody>
</table>

Learners' requirements

Tutors reported that the learners' initial requirements could vary depending on their level of experience with computers and their level of expertise with IT. One of the tutors mentioned that at the very least, the general initial requirements were "very basic IT skills and not being terrified of computers". The two other tutors reported that "the only requirement was to know how to use the system" and "it depends on each level".

Learning support from tutors

The answers to this question about the learning support were well distributed among the three options: (a) "no", (b) "yes", (c) "sometimes". The overall outcome was positive, since some of the respondents, three out of seven, had enough learning support from tutors. On the other hand, two out of seven did not have enough learning support from tutors. There were only two comments, one of the respondents who had answered "yes", commented that "now they have a proper base, computer and phone together". The other comment, from one of the respondents who answered "no", was "time prohibits this".
Table 4.3: Learning support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses</td>
<td>13</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

**Technical support**

The answers to the question about technical support were also very well distributed among the three options. However, unlike the previous outcome, they were rather negative, since some of the respondents, three out of seven, did not have enough technical support. On the other hand, two out of seven had enough technical support.

Table 4.4: Technical support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Average time spent on the training (per week)**

This question had four options for answers. They were based on the data gathered at the first meeting with the project leader of this online IT training. The options were: (a) "less than one hour", (b) "one to less than four hours", (c) "four to less than ten hours" and finally (d) "over ten hours". Three of the seven respondents were spending less than one hour per week on the training, while four were spending one to four hours. Nobody was spending more than four hours per week. This was the result of other commitments, either at their workplace or at their homes. The latter was especially true for women with children.

Table 4.5: Average time spent on the training (per week)

<table>
<thead>
<tr>
<th>Average time</th>
<th>Less than one hour</th>
<th>One to less than four hours</th>
<th>Four to less than ten hours</th>
<th>Over ten hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Most of them had expressed a wish to be able to spend more time on the training, but this had not been possible not only for the reasons mentioned above but also because, in a few cases, the course content had to be downloaded to the learners' own desks at their workplace. This was, sometimes, located in a distracting environment with excessive background noise such as people demanding attention. Furthermore, during one of the interviews, it was commented that 'the training demands a high degree of concentration'. As a result, the College provided computers that were located in a separate room, other than their own desks. However, this also generated problems of difficult access for the ones who were not able to leave their workplace during their work time in order to spend time on the training in another room. Another comment was that whenever the computer was located in another room for the training, there was no guarantee that it would be available for all enrolled in the training. It was found that one learner would be using the computer while another one would also want to do so. This overlap of availability between two or more learners caused frustrations and lead to less time being spent on the training.

4.6.3 Usability of the CBM

**Learners' reactions to the CBM**

For this section, a well-established instrument was adopted. This instrument is a multiple-choice questionnaire designed by Ben Shneiderman (1998) as a means to evaluate the level of usability of an information system. Shneiderman's instrument is divided into several aspects depending on the features of the system and the purpose of the evaluation. In this case, five aspects were taken into account. For each aspect, there is a different criterion polarized (value "1" for the most negative and value "5" for the most positive): (a) Overall reactions; (b) Screen; (c) Terminology; (d) Learning to operate the system; and (e) Installation/Downloading.

Thirty-four charts were created to illustrate the distribution of the responses given to each aspect of this section. The most extreme responses are presented and a summary is provided in table 4.6 (parts 1 and 2). The most
negative outcomes were about the speed of the installation and downloading; and their reactions to the CBM according to the rating B: "frustrating" = 1 to "satisfying" = 5. These are illustrated by figures 4.3 and 4.4.

**Figure 4.3: Speed of downloading**

Figure 4.3 shows that the learners had very different opinions about the speed of downloading. This is attributed to local factors (i.e. different individual computer processor attributes). Two out of six learners rated the speed of downloading as being "slow". The mean was therefore negative (2.33).

**Figure 4.4: Overall reactions to the CBM - Rating B**

Figure 4.4 shows that three out of seven respondents were neutral, however, four out of seven react rather negatively. From the ones who expressed a negative reaction, two out of seven rated the CBM as being "frustrating". The overall result was therefore negative (mean = 2.43). This might be attributed to the fact that there were "bugs" in the CBM as reported by one of the learners. Other reason could be due to the fact that the CBM assumes that the learner knows something that they might not know beforehand (as reported by another learner). The most positive outcome was about the character shapes (fonts) on screen. This is illustrated by figure 4.5. The criterion was about their level of legibility in a rating scale from: "barely legible" = 1 to "very legible" = 5.
This figure (4.5) shows that the respondents had a very positive reaction regarding the criterion 'legibility of the fonts' (mean = 4.14). More than a half (57.14%) found that the fonts were legible. Two out of seven found that they were "very legible" and only one in seven expressed a neutral reaction. To summarize the results, the mean values for each rating were calculated and the outcomes were tabulated. Table 4.6 illustrates these results on a scale from the most negative outcome to the most positive outcome.

### Table 4.6.a: Summary of the results regarding CBM (Part 1/2)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Reactions</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPEED OF DOWNLOADING &quot;slow&quot; = 1 to &quot;fast&quot; = 5</td>
<td>(-) Most Negative</td>
<td>2.33</td>
</tr>
<tr>
<td>OVERALL REACTIONS TO THE CBM rating B: &quot;frustrating&quot; =1 to &quot;satisfying&quot; = 5</td>
<td>Very negative</td>
<td>2.43</td>
</tr>
<tr>
<td>OVERALL REACTIONS TO THE CBM rating D: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>Slightly negative</td>
<td>2.86</td>
</tr>
<tr>
<td>OVERALL REACTIONS TO THE CBM rating E: &quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td>GETTING STARTED &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td>OVERALL REACTIONS TO THE CBM rating C: &quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>Neutral</td>
<td>3.00</td>
</tr>
<tr>
<td>PROGRESSION OF WORK RELATED TASKS &quot;confusing&quot; = 1 to &quot;clearly marked&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTION &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>PERFORMING AN OPERATION LEADS TO A PREDICTABLE RESULT &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>INSTALLATION/ DOWNLOADING rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>FEEDBACK ON THE COMPLETION OF A SEQUENCE OF STEPS &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
</tbody>
</table>

The most negative aspects of the CBM were:
- Speed of downloading
- Overall reactions to the CBM (frustrating to satisfying)
Table 4.6.b: Summary of the results regarding CBM (Part 2/2)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Reactions</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERALL REACTIONS TO THE CBM</td>
<td>Slightly positive</td>
<td>3.14</td>
</tr>
<tr>
<td>rating A: &quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOW OF SCREENS</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>&quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WORK RELATED TERMINOLOGY</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>&quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TASKS CAN BE PERFORMED IN A STRAIGHT FORWARD MANNER</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NUMBER OF STEPS PER TASKS</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>&quot;too many&quot; = 1 to &quot;just right&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMOUNT OF STEPS PER TASKS</td>
<td>Positive</td>
<td>3.28</td>
</tr>
<tr>
<td>&quot;adequate&quot; = 1 to &quot;adequate&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARRANGEMENT OF INFORMATION DISPLAYED ON SCREEN</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>&quot;logical&quot; = 1 to &quot;logical&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEXT SCREEN</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>&quot;unpredictable&quot; = 1 to &quot;predictable&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOING BACK TO THE PREVIOUS SCREEN</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>&quot;impossible&quot; = 1 to &quot;easy&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPUTER RELATED TERMINOLOGY</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>&quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERROR MESSAGES</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>rating B: &quot;unpleasant&quot; = 1 to &quot;pleasant&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPUTER KEEPS YOU INFORMED ABOUT WHAT IT IS DOING</td>
<td>3.43</td>
<td></td>
</tr>
<tr>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEARNING TO OPERATE THE SYSTEM</td>
<td>3.43</td>
<td></td>
</tr>
<tr>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCREEN LAYOUT WAS HELPFUL</td>
<td>Very positive</td>
<td>3.57</td>
</tr>
<tr>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESSAGES ON SCREEN</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>&quot;ambiguous&quot; = 1 to &quot;precise&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEPS TO COMPLETE A TASK FOLLOW A LOGICAL SEQUENCE</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USE OF TERMINOLOGY THROUGHOUT THE SYSTEM</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>&quot;inconsistent&quot; = 1 to &quot;consistent&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEEDBACK MESSAGES</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>&quot;unhelpful&quot; = 1 to &quot;helpful&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERROR MESSAGES</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>rating A: &quot;unhelpful&quot; = 1 to &quot;helpful&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHARACTERS ON THE COMPUTER SCREEN</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>&quot;hard to read&quot; = 1 to &quot;easy to read&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOWNLOADING ONLY THE MODULE YOU WANT</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>&quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFORMS YOU THE FILE SIZE FOR DOWNLOADING</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHARACTER SHAPES (FONTS)</td>
<td>Most positive (+)</td>
<td>4.14</td>
</tr>
<tr>
<td>&quot;barely legible&quot; = 1 to &quot;very legible&quot; = 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The most positive aspects of the CBM were:
- Screen layout was helpful
- Messages on screen
- Steps to complete a task follow a logical sequence
- Use of terminology throughout the system
- Feedback messages
- Error messages
- Characters on the computer screen
- Downloading only the module you want
- Informs you the file size for downloading
- Character shapes (fonts)

The cross sub-case studies analysis of the most negative results is described in the next section as an attempt to explore these issues.

**Cross sub-case studies summary of the results**

A cross sub-case's analysis was performed to investigate whether there were significant local factors affecting the previous outcomes (table 4.6). Table 4.7 illustrates this analysis. The shaded areas indicate where there were major differences between the opinions of learners of each sub-case.

**Table 4.7.a: Cross sub-case's summary of the results (Part 1/2)**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sub-case A1 (n=3)</th>
<th>Sub-case A2 (n=1) Telecom company</th>
<th>Sub-case A3 (n=2) Publishing company</th>
<th>Sub-case A4 (n=1) Local Leisure Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall reactions to the CBM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating A: &quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td>2.66</td>
<td>3.20</td>
<td>2.90</td>
<td>2.40</td>
</tr>
<tr>
<td>Rating B: &quot;frustrating&quot; = 1 to &quot;satisfying&quot; = 5</td>
<td>3.33</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Rating C: &quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>2.00</td>
<td>3.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Rating D: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.33</td>
<td>3.00</td>
<td>3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Rating E: &quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>2.66</td>
<td>3.00</td>
<td>3.50</td>
<td>2.00</td>
</tr>
<tr>
<td>2. Screen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characters on the computer screen</td>
<td>3.33</td>
<td>5.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Character shapes (fonts)</td>
<td>4.33</td>
<td>5.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Screen layout was helpful</td>
<td>3.33</td>
<td>3.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Amount of information displayed on screen</td>
<td>3.00</td>
<td>3.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Arrangement of information displayed on screen</td>
<td>3.33</td>
<td>3.00</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Flow of screens</td>
<td>3.33</td>
<td>4.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Next screen</td>
<td>2.60</td>
<td>4.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Going back to the previous screen</td>
<td>2.33</td>
<td>4.00</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Progression of work related tasks</td>
<td>2.00</td>
<td>3.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>3. Terminology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of terminology throughout the system</td>
<td>3.66</td>
<td>3.00</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Work related terminology</td>
<td>2.66</td>
<td>3.00</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Computer related terminology</td>
<td>3.33</td>
<td>3.00</td>
<td>4.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Messages on screen</td>
<td>3.33</td>
<td>3.00</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Instruction</td>
<td>3.66</td>
<td>3.00</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Computer keeps you informed about what it is doing</td>
<td>3.33</td>
<td>3.00</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Performing an operation leads to a predictable result</td>
<td>3.00</td>
<td>3.00</td>
<td>2.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Feedback messages</td>
<td>4.00</td>
<td>3.00</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Error messages, rating A</td>
<td>4.00</td>
<td>5.00</td>
<td>3.50</td>
<td>2.00</td>
</tr>
<tr>
<td>Error messages, rating B</td>
<td>3.33</td>
<td>4.00</td>
<td>3.50</td>
<td>2.00</td>
</tr>
<tr>
<td>4. Learning to operate the system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.22</td>
<td>3.50</td>
<td>4.16</td>
<td>4.00</td>
</tr>
<tr>
<td>Getting started</td>
<td>2.00</td>
<td>4.00</td>
<td>4.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Tasks can be performed in a straight forward manner</td>
<td>1.33</td>
<td>3.00</td>
<td>4.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Number of steps per tasks</td>
<td>2.33</td>
<td>3.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Steps to complete a task follow a logical sequence</td>
<td>2.66</td>
<td>3.00</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Feedback on the completion of a sequence of steps</td>
<td>2.33</td>
<td>3.00</td>
<td>4.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>
Table 4.7.b: Cross sub-case’s summary of the results (Part 2/2)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sub-case</th>
<th>Sub-case</th>
<th>Sub-case</th>
<th>Sub-case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1 (n=3) Local Council</td>
<td>A2 (n=1 Telecom company)</td>
<td>A3 (n=2 Publishing company)</td>
<td>A4 (n=1 Local Leisure Centre)</td>
</tr>
<tr>
<td>5. Installation/ Downloading</td>
<td>2.75</td>
<td>3.25</td>
<td>3.85</td>
<td>NA</td>
</tr>
<tr>
<td>Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.33</td>
<td>3.25</td>
<td>NA</td>
<td>3.85</td>
</tr>
<tr>
<td>Speed of downloading</td>
<td>2.66</td>
<td>1.00</td>
<td>2.50</td>
<td>NA</td>
</tr>
<tr>
<td>Downloading only the module you want</td>
<td>3.00</td>
<td>5.00</td>
<td>4.50</td>
<td>NA</td>
</tr>
<tr>
<td>Informs you the file size for downloading</td>
<td>3.00</td>
<td>5.00</td>
<td>4.00</td>
<td>NA</td>
</tr>
</tbody>
</table>

In this analysis, special attention was paid to 12 aspects of the CBM:

- Overall reactions to the CBM: rating "difficult" to "easy"
- Next screen: rating "unpredictable" to "predictable"
- Going back to previous screen: rating "impossible" to "easy"
- Progression of work related tasks: rating "confusing" to "clearly marked"
- Computer related terminology: rating "unclear" to "clear"
- Error messages: rating A "unhelpful" to "helpful"
- Error messages: rating B "unpleasant" to "pleasant"
- Learning to operate the system: rating "difficult" to "easy"
- Getting started: rating "difficult" to "easy"
- Getting started: rating "difficult" to "easy"
- Tasks can be performed in a straightforward manner: rating "never" to "always"
- Feedback on the completion of a sequence of steps: rating "unclear" to "clear"
- Installation/downloading: rating "difficult" to "easy"

The highest concentration of differences between sub-cases is regarding "learning to operate the system". Of the six criteria under this aspect, four indicate significant differences across sub-cases. Most of the significant differences highlighted are related to the fact that learners had different levels of expertise. Some learners were beginners, others were more advanced (table 4.1, section 4.6.1). One of the learners at the local council (learners who were beginners) did not have any IT training before and therefore faced more difficulty in learning to operate the system and found that the CBM was difficult. Regarding these two aspects: (1) overall reactions and (2) learning to operate the system, this respondent rated value "1" (the lowest value in the five-point scale) which therefore contributed to the low mean value encountered in the local council in relation to the other sub-cases (table 4.7). This assumption is also true when considering the contrast between the mean value of the local council and the publishing company in relation to the level of difficulty of the installation/downloading. In other words, the reason for this significant difference (2.33 for the local council and 4.50 for the publishing company) is attributed to the fact that one of the learners of the publishing company was at a more advanced level of expertise. Therefore they did not find that installation/downloading was difficult (table 4.8). A further analysis of the data was tabulated according the learners' level of expertise. Table 4.8 summarizes differences in outcomes according to the learners' level of expertise with IT. The results indicate that there is enough evidence to show that the learners' ratings on the reactions to the CBM are positive when their level of expertise is higher.
Table 4.8: Summary of the results in relation to the level of expertise

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Beginners</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Overall reactions to the CBM</strong></td>
<td>13.75/5 = 2.75</td>
<td>14.00/5 = 2.80</td>
<td>15.00/5 = 3.00</td>
</tr>
<tr>
<td>Rating A: &quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td>3.25</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Rating B: &quot;frustrating&quot; = 1 to &quot;satisfying&quot; = 5</td>
<td>2.25</td>
<td>2.50</td>
<td>1.00</td>
</tr>
<tr>
<td>Rating C: &quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>3.25</td>
<td>2.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Rating D: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.25</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Rating E: &quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>2.75</td>
<td>2.50</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>2. Screen</strong></td>
<td>29.00/9 = 3.22</td>
<td>34.00/9 = 3.76</td>
<td>35.00/9 = 3.89</td>
</tr>
<tr>
<td>Characters on the computer screen</td>
<td>4.00</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Character shapes (fonts)</td>
<td>4.25</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Screen layout was helpful</td>
<td>3.50</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Amount of information displayed on screen</td>
<td>3.25</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Arrangement of information displayed on screen</td>
<td>3.25</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Flow of screens</td>
<td>2.50</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Next screen</td>
<td>2.75</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Going back to the previous screen</td>
<td>2.75</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Progression of work related tasks</td>
<td>2.75</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>3. Terminology</strong></td>
<td>34.00/10 = 3.40</td>
<td>30.50/10 = 3.05</td>
<td>44.00/10 = 4.40</td>
</tr>
<tr>
<td>Use of terminology throughout the system</td>
<td>3.75</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Work related terminology</td>
<td>2.75</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Computer related terminology</td>
<td>3.25</td>
<td>2.50</td>
<td>6.00</td>
</tr>
<tr>
<td>Messages on screen</td>
<td>3.50</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Instruction</td>
<td>3.75</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Computer keeps you informed about what it is doing</td>
<td>3.25</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Performing an operation leads to a predictable result</td>
<td>3.00</td>
<td>3.50</td>
<td>2.00</td>
</tr>
<tr>
<td>Feedback messages</td>
<td>3.50</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Error messages, rating A</td>
<td>4.00</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Error messages, rating B</td>
<td>3.25</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>4. Learning to operate the system</strong></td>
<td>15.75/6 = 2.63</td>
<td>22.00/6 = 3.67</td>
<td>27.00/6 = 4.50</td>
</tr>
<tr>
<td>Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.50</td>
<td>4.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Getting started</td>
<td>2.00</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Tasks can be performed in a straight forward manner</td>
<td>2.75</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Number of steps per tasks</td>
<td>3.00</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Steps to complete a task follow a logical sequence</td>
<td>3.00</td>
<td>4.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Feedback on the completion of a sequence of steps</td>
<td>2.50</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>5. Installation/Downloading</strong></td>
<td>11.83/4 = 2.96</td>
<td>13.00/4 = 3.25</td>
<td>17.00/4 = 4.25</td>
</tr>
<tr>
<td>Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.75</td>
<td>2.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Speed of downloading</td>
<td>2.75</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Downloading only the module you want</td>
<td>3.33</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Informe you the file size for downloading</td>
<td>3.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>104.33/34 = 3.07</td>
<td>113.50/34 = 3.34</td>
<td>138.00/34 = 4.06</td>
</tr>
</tbody>
</table>

Though most of the students had a positive reaction towards the CBM, the beginners found that the package needs further development to be useful, there are many improvements to be made in its functionality and usability. These findings agree with the findings of a series of evaluations carried out by Hiltz (1994, p.249). The next figure (4.6) illustrates a summary of these findings.
The vertical axis represents the 5-point rating scale from the most negative (1) to the most positive (5) responses to the CBM by the learners. The horizontal axis represents the five main criteria: overall reactions to the CBM, screen, terminology, learning to operate the system and installation/downloading of the modules, the last bar represents the overall results which sums the mean values of all criteria.

Satisfaction with on-line training

The learners' level of satisfaction was very positive. Six out of seven respondents had rated "satisfied", while only one had rated "not satisfied at all". When they were asked about their level of satisfaction with the computer-based material (CBM) the responses were very positive again. Five out of seven had rated "satisfied", one of the seven respondents had rated "very satisfied" and only one out of seven had rated "not satisfied at all".

Table 4.9: Satisfaction with on-line training

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

4.6.4 Acceptability

Learners' preferences (traditional education or DE)

When learners were asked whether or not they would prefer taking this training by traditional education or distance education, the answers were quite well distributed. Four out of seven reported that they would prefer taking the training by traditional education and three out of seven would prefer taking the training at a distance. The comments reported by the respondents were diverse but nevertheless, they could also be categorized into one general argument for the ones who would have preferred the traditional way of learning, that is: to have the tutor on hand and therefore more available. For the three respondents who would have chosen distance education the comments could be categorized into two: (a) provides more flexibility and (b) able to learn at my own pace and workplace.
Meeting learners' expectations

The first level analysis of the responses for this case study detected a lack of understanding of the question "Have you had your expectations from the training met?" and the way it was supposed to be answered. The options of answers were "yes" and "no" and an open space for their comments. Despite this, it was possible to report that one of the respondents chose both ("yes" and "no") and commented on both answers. For this reason, this could not be taken into account since it was not clear if his/her expectations were met or not. Another respondent did not answer this question which leads to a sample of five respondents rather than seven. Two out of five chose "yes" while three chose "no". The comments for the ones who had had their expectations met were: (1) "improve my use of software" and (2) "no need to leave the workplace", the ones who had not had their expectations met commented that (1) "often assumes that you know something when you may not", (2) "it would meet my expectations if I had more time to do the course" and (3) "need more contact and advice from tutor". This lack of understanding of what had been asked led to a re-design of the layout of this question. In the subsequent cases, when this question was already reformulated, it was noticed that the respondents answered appropriately.

Learners' further comments or issues

Their comments or issues fall into three main categories:

(a) Technical improvements and limitations: there were two issues that fell into this category. One of the learners pointed out that the IT training was an "excellent idea" however, the CBM "needs amending and improving". Another learner wanted more interactivity rather than the CBM "just carry out command".

(b) Access: one learner from the publishing company highlighted that access to CD-ROM is more advantageous than having to download through the Internet when there are large groups of learners taking the same course. Another learner from the local council would prefer to have the CBM installed in his/her own computer so that he/she does not have to leave his/her workplace to take the training. This is the case of the learner who is a front desk receptionist who needs to be available to the community during his/her working hours.

(c) Communication: one of the learners would like to have more meetings with others taking the course so that he/she would be able to exchange experience with them and therefore learn from it.

Only one of the seven respondents did not have any further comments or issues. As an overall outcome, it was possible to make the assumption that the learners were normally quite positive about distance learning and about the way the training was being conducted by the College, in a more general way, and unlike their comments about the CBM, in particular.

4.7. Tutors' point of view on learners' performance

The tutors were asked a few questions about their points of view on the learners' performance. These questions were about (a) the learners' expectations, (b) main issues for the learners, and (c) whether or not the learners were receiving enough learning and technical support.

4.7.1 Learners' expectations

Further comparisons of the learners' responses and the tutors' comments on the learners' performance show that there was no significant difference between the tutors' point of view on the learners' expectations and the learners comments on their own expectations.

4.7.2 Main issues for the learners

According to the tutors, the learners' main issues were: (1) "lack of time", (2) "lack of motivation" and (3) "the need to know how and when to contact the tutor". The reason given by one of the tutors for the learners' lack of motivation was "lack of time; that is what they tell me". However, the tutors did think that the learners were motivated.
4.7.3 Learning and technical supports

When the tutors were asked if the learners were receiving enough learning support, the responses were "yes". This did not significantly differ from the learners' responses (three out of seven, "yes" and two out of seven, "sometimes"). Even though the tutors were more positively confident that they were providing enough learning support, the learners' responses to this question were more diverse (see section 4.6.2). When they were asked if they were receiving enough technical support, the responses given by the tutors were diverse: (1) "yes", (2) "maybe, it depends on each individual" and (3) "no". They were not as confident about this as they were about learning support. In general the tutors agree with the learners but they were perhaps more positive about the level of service than the learners. Having analysed both outcomes, learners and tutors, the next section discusses the issues captured in this case study.

4.8 Discussion

4.8.1 Towards a conceptual framework to explain the results

Although the sample of tutors and learners was quite small, there were emerging trends in the data. Figures 4.7 and 4.8 below propose an initial conceptual framework that seeks to offer an explanatory structure for the results. This framework is tentative at this stage but may be developed in later studies.

![Diagram](image)

**Figure 4.7**: Delivery of DE according to technical and social sub-systems at central and local points of delivery

Figure 4.7 structures the delivery of DE according to technical and social sub-systems at central and local points of delivery. Factors in each of these sub-systems contribute to the learners' experience.
Two major issues were detected with the methodology used (checklist, semi-structured interviews and semi-structured questionnaires). These issues are both usability (fitness for function) and organizational (local conditions) types of human factors issues (see the human issues in the taxonomy developed and presented in chapter I). Conclusive comments fall into two parts: (1) findings derived from analysis of the tutors and learners' responses and (2) the application of the methodology for this case study.

4.8.2 Findings

Having analysed the tutors and learners' responses, the general conclusion is that most of the critiques, complaints and negative comments were from the beginner learners. They were about the limitations of the CBM and about the local conditions that potentially affected the learners' experience and not about the IT training at a distance itself. The DE delivery by the College was appropriate. However, local factors (i.e. availability, isolation, the need for self-discipline, time management) contributed to the most negative responses by the learners. Despite these major issues, a positive attitude from both tutors and learners was particularly evident when they were asked to rate their level of satisfaction (see section 4.6.3). A more detailed awareness of the negative responses to the CBM was captured using the well-established multiple-choice questionnaire designed by Shneiderman (1998). In this case study, only a small fraction of this questionnaire was adopted, regarding the user overall reactions (Shneiderman, 1998; p.136). To illustrate the outcomes, 34 charts were constructed. The charts indicated the areas where the learners were having problems by pinpointing the usability issues on each aspect of the CBM. The administration of the questionnaires also proven to be useful in acquiring a more detailed range of usability issues. Table A-3 (appendix A-III) summarizes the results regarding the learners' overall reactions to the CBM.

Particular attention can be paid to the fact that most of the problems were related to the CBM and as a result from local factors (each sub-case study), but nevertheless the majority of responses were positive: 23 out of 34 (67.64%). Only a small fraction, six out of 34 (17.64%), was neutral. The number of negative responses was even smaller, five out of 34 responses (14.70%). The summary of the results regarding the CBM led to the conclusion that the CBM was not significantly problematic after all, and the usability issues detected were quite commonly encountered in many computer systems. Specially when considering local factors (i.e. different individual computer processor attributes and bandwidth) and that some of the learners were beginners seeking to improve their IT skills, to be more computer literate and to gain a formal qualification. Table 4.7 (section 4.6.3) highlighted the differences across sub-cases to investigate the influence of the local factors of each sub-case due to different context. The conclusion was that most of the differences were dependent upon local factors and due to the different levels of learners' expertise (table 4.8, section 4.6.3), individual computer processor attributes, and work commitments.

It is important to notice that without a large "N", it is difficult to achieve statistically significant results (Hiltz, 1994; p.72). However, the contrasts of the mean values were quite high among the different levels of
expertise by the learners, which is a strong indication that the level of expertise contributes to a more positive reaction towards the medium. By contrast to the level of expertise, the level of experience does not determine high performance and positive attitude to the CBM, although it may be an advantage in learning and using it (Mason, 1989).

4.8.3 Methodology adopted in this case study

The methodology adopted falls into three methods that were used in this case study:

Checklist

There were no problems regarding the use of the checklist. In this case, it was used during the first meeting with the project leader of the DE programme of the local College. Not surprisingly, it has proven to be a good means of ensuring that all the information that it was necessary to gather would be collected. It also guided the conversation acting as a good structure of the contents that needed addressing.

Questionnaire

The development of the instruments of the methodology was probably one of the greatest benefits of this case study. This study provided a good opportunity to refine the questionnaires. The refinement was possible because some of the questions had to be reformulated. Quite a few alterations were made which led:

(i) Firstly, to a more structured questionnaire design;
(ii) Secondly, to a reduction in the number of open-ended questions and an increase in the number of multiple-choice (closed-ended) questions; and
(iii) Thirdly, to pinpoint the questions that the respondents could misunderstand either due to the way in which they were written or to a lack of a more accurate language, which could also lead to ambiguity in the interpretation of what was being asked.

Interviews

The interviews revealed the reasons behind ratings and other answers and helped to build up the context in which learners were taking the training by detecting individual issues that were definitely dependent upon each context (sub-case studies) and individual circumstances. On one hand, both personal interviews with tutors and learners proved to be very valuable, on the other hand they were time consuming, in terms of reaching each tutor and learner individually at their workplace. Interview protocols need to be developed for later studies to ensure systematic treatment of the issues. The next chapter is concerned with the next case study (B), the evaluation of DE via videoconferencing.
Chapter 5

The Evaluation of Distance Education via Videoconferencing - Case study B

5.1 Chapter outline

The previous chapter described initial fieldwork on on-line training at a distance. This chapter describes fieldwork on Distance Education (DE) by videoconferencing. The structure of this chapter is divided into the following sections: section two outlines a description of the context in which DE via videoconferencing is used at this setting. Section three describes the methodology adopted for this case study. Section four presents the analysis of the lecturers' responses to DE via videoconferencing. Section five presents the analysis of the students' responses. Section six summarizes the results and section seven presents a discussion which offers a conceptual framework to explain the results. Figure 5.1.a illustrates chapter 5 in relation to the overall thesis structure.

A university in Northern Ireland provided an appropriate setting for conducting this fieldwork. Interactive videoconferencing began at this University in 1990 as a result of a specific demand following a merger in 1984 when a multi-campus institution was established. This linked four campuses in different towns in Northern Ireland: Coleraine, Londonderry, Jordanstown and Belfast. To investigate the use of videoconferencing as a means of delivering DE as well as to evaluate the usability and the acceptability of DE via videoconferencing, it was necessary to carry out this fieldwork as a case study. Although the usability and acceptability of a system, technology, programme or organization can be measured using different approaches, this survey was conducted using an empirical approach to the real world setting: a university in Northern Ireland. Figure 5.1.b illustrates the taxonomy of DE according to its means of communication (chapter 1) in which the shaded box indicates the kind of DE under investigation.

5 e.g. The automatic tools for helping usability evaluations: (a) the alternative suggested by Apteker, Fisher, Kismov, and Neishols (1994) for evaluating DE via videoconferencing in terms of Quality of Service (QoS), and (b) laboratory experiments such as the ones performed by Gnsici, Papa, and Spedaletti (1999).
5.2 The university context and videoconferencing

In 1984, the University was chartered to advance education in Northern Ireland as an attempt to reduce travel claims by lecturers who would travel between campuses 55 and 122 kms apart and to attend a demand for increasing course viability for postgraduate students in each campus (Abbott, Dallat & Robinson 1995; p.77). One solution was the use of audioconferencing facilities, which had been available since 1985/6. However, Abbott et al. (1993) reported that the use of audioconferencing was not successful at this University. After a series of evaluations on the use of audioconferencing by lecturers and students of the University, they were convinced of the need to avoid it for teaching and learning due to technical and communication difficulties. It was thought that videoconferencing might overcome these difficulties and partial funding was obtained by the EU "Star" project in 1989. The decision was subsequently taken to set up a pilot system among the main campuses, which then became operational in October 1990.

In 1990/91, three of the four campuses were linked by two-way videoconferencing through land-line video compression. Students of this University could attend classes at their nearest campus and this made courses increasingly viable. As a result, the University could fulfil its charter and efficiency could be met. Dallat et al. (1992) reported an immediate saving in travel claims for the first three modules taught by videoconferencing (Abbott, Dallat & Robinson, 1995; p.77).

In 1992/93, the University adopted three-way videoconferencing. Students were distributed across three campuses and only one lecturer was involved. The use of videoconferencing was slightly broader than in the previous years. For example, for the course "Education for mutual understanding and improved community relations" there were three videoconferencing ways of teaching: firstly, use of videoconferenced teaching to one distant group with the lecturer remaining for the most part at his or her home location; secondly, teaching two groups at different locations linked by videoconferencing with the lecturer alternating between locations and; thirdly, teaching three groups at different locations linked by videoconferencing with the lecturer allocating his/her time to the various groups as seemed most fair and equitable. Abbott et al. (1993, p.16) highlighted that teaching by videoconferencing on three locations was, as would be expected, much more complex than teaching on two. According to IDE (1997), the greater the number of sites, the greater the complexity, technically, logistically, and perceptually:
Class sessions involve synchronous communication; students and lecturers are required to be in a particular place at a particular time;

- Number of sites can vary from two (point-to-point) to five or more (point-to-multipoint). In this case, there is one site for each campus;
- Students enrol at sites more convenient to their homes or work locations than to the campus where the lecture is held;
- The nature of the experience mimics that of the classroom for both the lecturer and the student.

Since the use of videoconferencing began in this University, a series of evaluations has been carried out by Dallat et al. (1992) and Abbott et al. (1993). In their evaluations, the same instruments: interviews, questionnaire administrations and observation, were used as in this study (see next section 5.3). However, their emphasis differs from the views of this research in the sense that this research takes into consideration the human factors/ergonomics aspects of the interaction between the educational technology for DE, the educational institution and the stakeholders as part of a socio-technical system. By contrast, Abbott, Dallat and Robinson (1995) were concerned with the pedagogical aspects. For example, the formal atmosphere of the videoconferenced communication would affect the interaction and therefore it would sacrifice the quality of the videoconferenced course. Another pedagogical aspect of concern was related to the teaching and learning styles. They found that lecturers' teaching style was more affected by videoconferencing than was the learners' learning style (p.79). In the case when the lecturer is teaching both on-site students and remote-site students, there was the concern of offering a balance between these two groups of students so that the distant group would not feel neglected. Lastly, there was the concern that the videoconferencing course would not achieve the goals of being equivalent to face-to-face teaching. The physical arrangement by which videoconferencing was delivered was as follows: the lecturer, and depending on the occasion, the group of on-site students are physically separate but interacting with each other at a distance in the videoconferencing lecture room as shown in figure 5.2.

![Photo by Terry Curran, UU, Londonderry, N. Ireland](image)

**Figure 5.2:** Physical installations of a videoconferencing lecture room

The technology was custom-designed to comply with the University's aim of producing a facility which would double as a comfortable and technically advanced environment for all kinds of administrative meetings, and as a technologically advanced and flexible vehicle for distance teaching purposes. Thus the videoconferencing lecture rooms were equipped with such features as robotically controlled cameras, which allowed the lecturer or the conference manager, by means of a graphic tablet (figure 5.3) and a multiplicity of camera shots pre-stored in the control computer, to "zoom in" rapidly on a particular section of the audience, or even on a particular student, on any campus at any time, and thus to give that group or individual "the floor" as required.
These cameras are controlled from the lecturer's desk. The lecturer sits at his/her desk which faces the audience (figure 5.4) in his/her own videoconferencing lecture room.

The lecturer is able to employ various technical devices to transmit a variety of graphical images including transparencies, slides and still or video images (figure 5.5) to the other sites. Lecturers can also control a second camera that he/she can use to transmit his/her activities to the same remote sites. There is one microphone for each two students.
Students who live around Coleraine would therefore be enrolled in courses taught in Coleraine. They would attend videoconferenced classes at the videoconferencing lecture room based in Coleraine. The lecturer would have to make an appointment so that the facility would be reserved for his/her classes. Lecturers would have to be organized so that all the course material is sent (by post) to the students well in advance. Videoconferenced classes taking place in Coleraine are transmitted to other groups of students located on other campuses. At the time of this study, an opportunity to observe a videoconferenced class was obtained. This class was being taught at the videoconferencing lecture room in Jordanstown and transmitted to the group of students located in Coleraine.

For every videoconferencing class there is a technician available. This provides the lecturer with a handy technical support which is convenient since technical difficulties are likely to occur. Figure 5.6, illustrates the layout of the videoconferencing lecture room. The next section describes the methodology adopted in this case study, the aims, the instruments and procedures to achieve these aims and the samples of the surveys conducted in this case study.
5.3 Methodology adopted

5.3.1 Aims of case study B

a) In this case study the general aim is:

- To identify whether or not the issues are of the same kind of the previous case study (chapter 4) and to identify what issues affect the use and the attitudes towards videoconferencing as a means of DE delivery at a distance. In the previous case study (A) it was found that the two major human factors issues were usability, fitness for function and organizational, local conditions (see the human factors issues in the taxonomy developed previously and presented in chapter 1).

b) The specific aims, behind the general aim, are:

- To build up a preliminary conceptual framework capable of modelling the causes and effects of the issues;
- To investigate how videoconferencing fits into the teaching and learning processes;
- To investigate to which extent, DE via videoconferencing is effective; and
- To investigate whether there is a relationship between the students’ level of experience with DE via videoconferencing and their level of satisfaction with this mode of learning.

5.3.2 Sources of data

The instruments adopted in the surveys with the stakeholders included: semi-structured interviews, postal questionnaires (appendix B-I: lecturers’ questionnaire and appendix B-II: students’ questionnaire) and videoconferencing lecture room observation. Unlike the previous case, it was not possible to interview each student individually. However, a videoconferenced class was observed and videotaped as a valuable additional source of data to provide qualitative explanations to quantitative findings. Factual information was obtained through the study of articles published by some of the lecturers from this University on their experience with teaching via videoconferencing. Questionnaires for these students were administered during the class break.

To move from interviews to questionnaires, the questionnaires had undergone some alterations since the previous case study. Although, the essence was kept, lessons learned from the previous study led to the design of some closed-ended questions that were open before. The questionnaires became less open and more structured, especially for the students. Furthermore, another set of questions (regarding the use of videoconferencing) was included in the questionnaire, since in this case, lecturers and students were teaching and learning via videoconferencing which was not used in the previous case.

5.3.3 Procedures

This University in Northern Ireland was approached through a senior lecturer in the School of Social and Community Sciences based at Coleraine. During the first meeting, the aims of this study were discussed and confidentiality concerns were clarified. Arrangements for the meetings for individual interviews and questionnaire administrations were initiated. Access to students was, therefore, gained through permission given by their respective lecturers. Initially, it was possible to survey nine lecturers, one manager, one technician and 16 students. Approximately six months after the visit to Northern Ireland, 40 more questionnaires were sent out to survey two other groups of students. Of these 40 questionnaires, nine were completed and returned by the first year student's group and eleven were completed and returned by the second year student's group, a return rate of 50% was therefore achieved in the second part of the study.
5.3.4 Sample

The sample of 36 students represented approximately one third of the population of the North Irish students within this university setting who were taking classes at a distance via videoconferencing during the time of this survey. For this research needs reasons, this sample is divided according to their level of experience with learning at a distance so that the outcomes can be contrasted. Thus the sample is divided into sample A (31 students) and sample B (five students). Sample A includes the students who were inexperienced, and who were learning at a distance via videoconferencing for the first time at the time of this survey. Sample B includes those five students who already had a past experience with learning at a distance via videoconferencing. In the case of lecturers, the sample of nine lecturers represented approximately half of the population of lecturers with experience of teaching at a distance via videoconferencing. The next section presents the analysis of the lecturers' responses to videoconferencing.

5.4 Lecturers' responses to videoconferencing

The sample of lecturers consisted of nine lecturers. Six lecturers were located at Coleraine campus, two lecturers at Jordanstown campus and one lecturer at Londonderry.

5.4.1 Lecturers' background

Seven out of nine surveyed lecturers were male. Five out of nine were in their forties. The subject matter they were teaching varied. Lecturers were from different departments: Information and Software Engineering; Education; Computing and Mathematics; Commerce and International Business Studies; Languages Resource Unit; Public Policy; Economics and Law; and Psychology and Communication. Three out of nine lecturers were with the Department of Education.

The lecturers were quite experienced with teaching at a distance via videoconferencing. One lecturer had been teaching via videoconferencing for more than ten years. Three lecturers had been teaching at a distance via videoconferencing for between five and ten years. Two lecturers had been teaching via videoconferencing for between two and five years. Three other lecturers had been teaching for up to two years.

Lecturers' expectations

Lecturers were asked to comment on their expectations of videoconferencing. They provided very different answers. The responses given by the lecturers can be divided into six categories:

(a) Pragmatic and Problem-solving: the pragmatic type of expectation is related to the benefits DE can offer to practical matters. This can, sometimes, be related to the "problem-solving" category or to the "student centred" type of expectation. From a pragmatic perspective, lecturers expect DE to solve practical matters such as: "to maintain viability of courses", "to save travel time and cost of travel", "to substitute, effectively, visit of students abroad", "to substitute internal travel", "to disseminate course material effectively" and "to be more convenient for a class that was on two campuses".

(b) Personal aspirations: this type of expectation refers to the lecturers' ambitions and professional advancements. Under this category, lecturers expect "to acquire more experience" and "that teaching at a distance by videoconferencing" would be "a form of professional updating".

(c) Business opportunities: the "business opportunities" category is normally associated with the lecturers' ambitions in terms of what they would like to use videoconferencing for. From this perspective, one lecturer expects "to set up international teaching links with Europe". This is a typical example of his/her expectation being strongly dependent upon his/her own subject matter. In particular, this lecturer was from the Language Resource Unit so that this usage of videoconferencing would be highly effective to establish links with Europe.

(d) Student centred: this category refers to the lecturers' expectations about their students. This includes: "to meet needs of students", "to substitute, effectively, visit of students abroad and dialogue with students" and "to develop students' competence in a time and cost effective way".
(e) Academic: this category is associated with the lecturers' expectations when these are strongly related to the use of DE via videoconferencing as being the subject of research itself. For instance, one lecturer expected "to understand the pedagogical requirements for DE and to research its implications for schools".

(f) Pessimistic: there was only one pessimistic type of expectation. One of the lecturers had a rather negative expectation about DE via videoconferencing. He/she expected that "it would be problematic". This may be an example of a subject dependent expectation since the subject this lecturer teaches, linguistics, "requires a lot of dialogue, student's activity and practical analysis".

**Reasons for teaching at a distance via videoconferencing**

The format of the question about the reasons for teaching at a distance was open-ended and again the lecturers' responses were diverse. One lecturer did not answer this question. Having analysed their responses, it was not clear whether the lecturers had a choice between teaching traditionally or by videoconferencing. Nevertheless, the analysis of the data from interviews suggests that some lecturers were encouraged to teach at a distance by videoconferencing by their departments. They gave the following kinds of reasons:

(a) Pragmatic (5):
- It saves time
- It avoids travelling
- It is convenient

(b) Economical (2):
- It saves money
- It reaches a wider audience

(c) Academic (1):
- It provides the lecturer and the students with the development of ICT (Information and Communication Technology) skills

These categories indicate that the reasons for lecturers to teach at a distance via videoconferencing were typical of most of the on-line lecturers elsewhere (e.g. North America, see next chapter). So that the lecturers would develop their ICT skills on dealing with the technology for DE and would not have to spend time and money on travelling from one campus to another campus on a regular basis which are therefore more convenient as well. Students who would not be able to attend classes on a particular campus would be able to attend classes at the nearest campus via videoconferencing, which is not only more convenient to the lecturers but also to the students. On the other hand, from the University's point of view, it saves money that would otherwise pay the lecturers travel claims as well as it allows for reaching a wider audience of students.

Having a general understanding of the lecturer's background, their expectations and their reasons for giving a course at a distance via videoconferencing, the next section presents the analysis of the results for the usage of the videoconferencing technology.

**5.4.2 Usage of videoconferencing for DE**

The context of use of the videoconferencing technology provides a framework for determining its usability. The next sections present the context of use of the videoconferencing technology for DE by the lecturers.

**Lecturers' task**

The lecturers reported that, during the early months since the implementation of the videoconferencing system, lecturers' workload was increased. They would spend more time on the preparation of course material. Time was also spent on the choice of the pedagogical strategy. Both lecturers and students had to learn about the medium as they went along (Abbott, Dallat & Robinson, 1995; p.78). Lecturers learned from the first experiences that they would have to establish a balance between on-campus and cross-campus dialogue, between videoconferenced and face-to-face classes and between lecturer input and student input.
Despite Abbott, Dallat and Robinson having conducted the first evaluation sessions, some of the recommendations from these sessions were not implemented. For example, lecturers became aware for the need of an induction session about the videoconferencing system for the students. This would provide an initial face-to-face meeting with the students and include a firm basis for course content, with an hour set aside for familiarization with the technology. Conversely, one lecturer felt that one hour was insufficient and another believed that the students would learn about the medium as they used it (Abbott, Dallat & Robinson, 1995; p.79). Besides these concerns with the pedagogical strategy and the medium, lecturers perform the following tasks:

Table 5.1: Tasks performed by the lecturers

<table>
<thead>
<tr>
<th>General tasks</th>
<th>Specific tasks using videoconferencing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prepare lecture material</td>
<td>Send copies to other campuses by e-mail or post</td>
</tr>
<tr>
<td>2. Prepare handouts for students</td>
<td>Arrange rotation at all campuses</td>
</tr>
<tr>
<td>3. Book videoconferencing classrooms and organize timetables</td>
<td></td>
</tr>
<tr>
<td>4. Deliver lecture</td>
<td>Deliver and operate videoconferencing facilities</td>
</tr>
<tr>
<td>5. Set assignments</td>
<td>Collect assignments from all sites</td>
</tr>
<tr>
<td>6. Respond to students' queries and provide feedback</td>
<td>Use of e-mail for communication with students</td>
</tr>
<tr>
<td>7. Meet students face-to-face in tutorials (e.g. before exams)</td>
<td></td>
</tr>
<tr>
<td>8. Set and mark exams</td>
<td></td>
</tr>
</tbody>
</table>

These tasks may be affected by the fact that lecturers' attention had to be divided between teaching and dealing with the technology (i.e. operating the videoconferencing equipment during the lecture). However, the specific task of operating the videoconferencing facilities is strongly dependent upon the kind of videoconferencing system. Since most of the lecturers within this University were using the videoconferencing system through TV screens and ISDN connections, the analysis will focus on this particular system, although few responses refer to the PC desktop videoconferencing. During the presentation of the analysis of the lecturers' responses, this kind of system will be highlighted to differentiate from the standard system used by this University.

Lecturers' role when teaching at a distance via videoconferencing

Teaching style can be affected by the use of videoconferencing due to the very static nature of the technology and a rather formal atmosphere of the teaching and learning processes through videoconferencing. The formal atmosphere is related to the class room layout (e.g. fixed seating in rows), and to the interactive device (e.g. screen) which restricts body language and eye contact. As an attempt to overcome this, one lecturer pointed out that he or she has to speak more clearly and has to be more expressive in terms of both facial expression and body language. However, regarding the lecturers' role, results indicated that they fall into six categories. The values between brackets indicate the frequency in which these categories have been mentioned:

(a) Categories about the lecturers' general roles:
- Facilitator (2): they play a facilitatory role, they guide and supervise students' work;
- More lecturer-led (1): one lecturer argued that it became more lecturer-led due to the difficulties in participating faced by the students;

(b) Categories about their specific tasks:
- Integrate more 'socializing' strategies (1): when teaching at a distance, one lecturer felt that students need to play a more active role and the lecturers should encourage them to participate during class by communicating more;
- Wait for feedback (1): since communication appears to be delayed, less effective during videoconferencing sessions, lecturers need to wait longer for students' feedback;
- Need to be more organized (2): they need to prepare course content so that this would reach the students prior to videoconferencing session. They need to send out print material to the students in advance;
- No change, the role is the same (1).
General problems when teaching at a distance via videoconferencing

To detect further issues, sometimes overlapping with other questions on the questionnaire, a section about their general problems when teaching at a distance via videoconferencing was included in the questionnaire. The questions were divided into three sub-sections: (a) problems of the workstation - physical installations of the videoconferencing lecture room; (b) problems related to the environment of the videoconferencing lecture room; and (c) problems related to the organization of the videoconferencing course. A five-point rating scale was used from "too problematic=1" to "no problem at all=5".

a) Problems of the workstation - physical installations of the videoconferencing lecture room

Lecturers and on-site students (if it is the case) meet at the same lecture room. Although their use of the lecture room is very different, they share the same range of possible problems. This section is divided into ten aspects, for each aspect the mean was calculated. Early evaluations by Robinson recommended a fax machine in each videoconference lecture room so that print material could be sent out to the remote site students if the lecturer did not have a chance to do that beforehand. See the summary of the results reported by the nine lecturers in table 5.2.

Table 5.2: Potential problems of the workstation

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot rest</td>
<td>5.00</td>
</tr>
<tr>
<td>Chair</td>
<td>4.89</td>
</tr>
<tr>
<td>Tools' location</td>
<td>4.67</td>
</tr>
<tr>
<td>Furniture</td>
<td>4.67</td>
</tr>
<tr>
<td>Video quality</td>
<td>4.55</td>
</tr>
<tr>
<td>Dimensioning of furniture</td>
<td>4.44</td>
</tr>
<tr>
<td>Fax machine</td>
<td>4.44</td>
</tr>
<tr>
<td>Position of cameras and monitors</td>
<td>4.22</td>
</tr>
<tr>
<td>Seating arrangement</td>
<td>4.11</td>
</tr>
<tr>
<td>Audio quality (i.e. overlapping voices)</td>
<td>3.78</td>
</tr>
</tbody>
</table>

The mean values calculated for each aspect of the lecturers' workstations highlighted the ones with some difficulties. Position of cameras and monitors, seating arrangements and audio quality were "somewhat problematic". However, the overall result was positive.

b) Problems related to the environment of the videoconferencing lecture room

This section is divided into five aspects, for each aspect the mean was calculated, see the summary of these results in table 5.3.

Table 5.3: Potential problems related to the environment of the videoconferencing lecture room

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illumination</td>
<td>4.78</td>
</tr>
<tr>
<td>Location</td>
<td>4.78</td>
</tr>
<tr>
<td>General layout</td>
<td>4.55</td>
</tr>
<tr>
<td>Noise</td>
<td>4.33</td>
</tr>
<tr>
<td>Temperature</td>
<td>4.00</td>
</tr>
</tbody>
</table>

The mean calculated for each aspect related to the environment highlighted the ones with some difficulties. Two out of five (40%) were considered slightly negative: (a) "temperature" and (b) "noise" were "somewhat problematic". However, the overall outcome was positive.
c) Problems related to the organization of the videoconferencing course

This section is divided into three aspects, for each aspect the mean was calculated, see the summary of these results in table 5.4.

**Table 5.4: Potential problems related to the organization of the videoconferencing course**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent on learning to operate the technical equipment</td>
<td>4.22</td>
</tr>
<tr>
<td>Time spent on preparing the course</td>
<td>4.00</td>
</tr>
<tr>
<td>Timing and synchronization of the videoconference</td>
<td>3.89</td>
</tr>
</tbody>
</table>

This section was the one that the lecturers rated less positively. However, none of the aspects was rated as being "problematic". The average found for all three aspects of this section was slightly negative. "Time spent on preparing the course", "time spent on learning to operate the technical equipment" and "timing and synchronization of the videoconference" were "somewhat problematic".

**Main method(s) of contact with students**

Interaction between lecturers and students is an essential factor in DE. This involves face-to-face meetings and communication. Thus, lecturers were asked what was (were) the main method(s) of contact with students. For this closed-ended type of question, five options were available to the respondents: (a) "e-mail", (b) "videoconferencing", (c) "telephone", (d) "fax" and (e) "others". Most of the lecturers contacted their students through e-mail and videoconferencing. Eventually, material is posted to the students who also post their assignments, reports and essays if they do not use e-mail for these purposes.

**Main problems when contacting the students**

Lecturers were asked to report their problems when contacting the students according to each method of contact. They reported that the problem with e-mail as a means of contacting the students was that students do "not always read the messages and are slow to reply" since they access it occasionally. An additional concern was that they did not know if the messages had been received. One of the lecturers commented that the problem with using PC desktop Windows-based videoconferencing technology was that "if the remote sites do not have experience then connections can sometimes be difficult". However, seven out of nine of the surveyed lecturers in this University were not using PC desktop Windows-based videoconferencing technology but the videoconferencing technology through TV screens and ISDN connections. Even knowing that there were issues, at this point, there were no comments or complaints about this type of videoconferencing as a means of contacting the students.

**Frequency of contact with students (face-to-face meeting)**

To detect the frequency in which the lecturers meet their students, a range of nine options was available: (a) "never", (b) "once a week", (c) "three times in a month", (d) "twice a month", (e) "once per month", (f) "three times in a semester", (g) "twice in a semester", (h) "once a semester" and (i) "not applicable" (NA). Answers for this question were diverse. Table 5.4, illustrates the dispersion of the responses given.
Table 5.5: Contact with students (face-to-face meetings)

<table>
<thead>
<tr>
<th>Number of lecturers</th>
<th>Frequency of meetings with students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Never</td>
</tr>
<tr>
<td>1</td>
<td>Once a week</td>
</tr>
<tr>
<td>0</td>
<td>Three times in a month</td>
</tr>
<tr>
<td>2</td>
<td>Twice a month</td>
</tr>
<tr>
<td>1</td>
<td>Once a month</td>
</tr>
<tr>
<td>1</td>
<td>Three times in a semester</td>
</tr>
<tr>
<td>1</td>
<td>Twice in a semester</td>
</tr>
<tr>
<td>1</td>
<td>Once a semester</td>
</tr>
<tr>
<td>2</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Table 5.5 indicates that two lecturers out of nine did not think this question was applicable and two other lecturers contacted the students on a face-to-face basis "twice a month". All the others gave different answers.

Benefits and advantages of DE via videoconferencing

When the lecturers were asked to report on the benefits and advantages of DE via videoconferencing, the responses were diverse. The original comments are categorized as follows:

(a) Economic: from an economic perspective, teaching at a distance via videoconferencing is cheaper for the institution and cheaper in lecturers' time;
(b) Student centred: provides the students with a more independent learning and it reaches an audience who would have been excluded;
(c) Pragmatic: it avoids travels, tiredness and risks associated with driving to other campuses, and therefore it saves time;
(d) Academic: teaching at a distance via videoconferencing promotes student's self-discipline. Another comment that falls into this category was that it allows for curriculum enrichment for rural schools.

Requirements for teaching at a distance via videoconferencing

When lecturers were asked to report on their initial requirements for teaching at a distance via videoconferencing, their comments could be categorized into the following:

- Informal training
- Technician available
- Short talk with the technician
- Time to plan lectures in advance
- Demonstration sessions from a colleague and a technician

So far, the number of comments mentioning and sometimes emphasising the technician was quite high. Thus, it is important to highlight that the technician plays a very important role in the process of teaching at a distance via videoconferencing.

Technical support

The observation session of the videoconferencing lecture room as well as the demonstration of the videoconferencing facilities by the technician demonstrated that technical support is an essential factor that determines the level of usability and acceptability of such a system/technology by its stakeholders. Moreover, technical support is a strong indication of determining the success of a system/technology. This was assessed, by providing the lecturers with three options to the question about whether they were having enough technical support: (a) "yes", (b) "no" and (c) "sometimes" and a space for comments. The overall outcome was positive. Six out of nine lecturers had a positive attitude towards the technical support. This was due to the existence of a technical support unit and experienced technicians. Only three out of nine reported that they only had technical support "sometimes". This was due to the fact that there was no technical support after 5.00 PM and that was the time when two of these respondents started their classes.
Table 5.6: Technical support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Somewhat positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Time spent on learning to operate the videoconferencing equipment

Although the lecturers had indicated that the technical support was very important in using the videoconferencing equipment, they did not spend a great deal of time learning to operate the equipment. This led to the assumption that time spent on learning to operate the videoconferencing equipment was not an issue (table 5.4 confirms this). Although learning was still necessary. It was found that this question would be more appropriate in an open-ended format, since it had not been tested before because it was not relevant to the previous case study (A). This would give the respondents a certain degree of freedom and a possibility for providing more accurate answers. After analysing these answers, it was possible to establish a range of possible options (categorization). Nonetheless, the point was to have an idea of the time spent on learning to operate the videoconferencing equipment and the answers given had shown to be much less than one hour for the majority of the lecturers.

Specific recommendations about the usage of videoconferencing for distance teaching

Six out of nine lecturers expressed their recommendations. After analysing their comments, it was possible to categorize them into two main areas: (a) recommendations about the organization, i.e. better instructions, planning and management, and (b) about the layout of the equipment.

5.4.3 Usability of videoconferencing for DE

Lecturers' impressions about using videoconferencing

Likewise the section on impressions about using the CBM (computer-based material) administered in the previous case study (chapter 4), in this case study a well-established instrument was adopted. This instrument is a multiple-choice questionnaire designed by Shneiderman (1998) as a means to evaluate the level of usability of a videoconferencing system. The original questionnaire has seventeen rating scales type of questions. However, only thirteen questions were applicable for the type of videoconferencing system used by this University.

This section differs from the previous version that was administered in the previous survey since the DE programme at the local College was not using videoconferencing. Each question is specifically related to an aspect of the videoconferencing system. For each aspect, a rating scale from one (most negative value) to five (most positive value) is used, the labels being varied to match the subject of each question. Thirteen charts were constructed to summarize the results of each aspect of this section. Three of these aspects are reported, the one most negative and the two that were most positive. A summary of all the results follows this presentation.

a) The focus of attention

Lecturers and students need to be able to determine the location of the person who is speaking during the videoconference so that they can look at this person. In the case of the lecturers this is even more critical. After determining who is speaking, they need to be able to set the zoom to this person (i.e. a student) so that his/her face is shown in one of the little screens in his/her control display. During this process, lecturers' concentration is split between teaching and dealing with the technology (Abbott, Dallat & Robinson, 1995; p.78). This can be particularly difficult in a videoconferencing session where students and lecturers are communicating through video channels (figure 5.7). Later, in this chapter, other factors affecting the effectiveness of the videoconferencing for DE are presented.
Figure 5.7: Lecturers' attention is split between teaching and dealing with the technology.

Figure 5.8: Determining the focus of attention during conference.

The average score of 2.77 was slightly below the value 3.00 which is neutral. Two out of nine lecturers found that determining the focus of attention during conference was "confusing", while only one lecturer rated it as being "clear". This slightly low mean value might have been affected by the fact that one of the recommendations suggested by the faculty in earlier evaluations was not implemented. This was the use of mobile microphones instead of having one desk microphone for each pair of students (commented by one of the lecturers during the interview).
b) Establishing video connections

![Graph showing time to establish video connections]

**Figure 5.9: Time to establish the video connections to others**

This aspect was one of the most positively rated (mean = 4.33). Figure 5.9 illustrates that eight out of nine lecturers rated time to establish the video connection to others very positively. The reason for this being the most positive response was that the video connection is set by the technician.

c) Number of connections possible

![Graph showing number of connections possible]

**Figure 5.10: Number of connections possible**

The three-way videoconferencing system was established in 1992/93 following a demand to provide the same course, given by one lecturer, to three groups of students on three campuses. Despite this University having four campuses, lecturers thought that the number of connections possible by the current videoconferencing system was sufficient since it was mentioned previously that the more connections are established, the more complex is the teaching. Figure 5.10 shows that the lecturers rated, very positively, the number of connections possible. The majority, six out of nine, rated that the number of connections was "enough". Therefore, the overall result was very positive (mean = 4.33).
**d) Overall results**

**Table 5.7: Summary of the results regarding the use of videoconferencing by the lecturers**

<table>
<thead>
<tr>
<th>Impressions about using videoconferencing</th>
<th>Criteria</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determining the focus of attention during conference was</td>
<td>&quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td>2.77</td>
</tr>
<tr>
<td>Arrangement of windows showing connecting groups</td>
<td>&quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.00</td>
</tr>
<tr>
<td>Getting started</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.33</td>
</tr>
<tr>
<td>Video image flow</td>
<td>&quot;choppy&quot; = 1 to &quot;smooth&quot; = 5</td>
<td>3.37</td>
</tr>
<tr>
<td>Window(s) with view of connecting group(s) is of appropriate size</td>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.43</td>
</tr>
<tr>
<td>Window with view of your own group is of appropriate size</td>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.50</td>
</tr>
<tr>
<td>Learning to operate the system</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.55</td>
</tr>
<tr>
<td>Audio output</td>
<td>&quot;inaudible&quot; = 1 to &quot;audible&quot; = 5</td>
<td>3.66</td>
</tr>
<tr>
<td>Audio is in synchrony with video images</td>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.77</td>
</tr>
<tr>
<td>Setting up for conference</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>4.00</td>
</tr>
<tr>
<td>Focus of video image</td>
<td>&quot;fuzzy&quot; = 1 to &quot;clear&quot; = 5</td>
<td>4.00</td>
</tr>
<tr>
<td>Time to establish video connections to others</td>
<td>&quot;too long&quot; = 1 to &quot;just right&quot; = 5</td>
<td>4.33</td>
</tr>
<tr>
<td>Number of connections possible</td>
<td>&quot;too few&quot; = 1 to &quot;enough&quot; = 5</td>
<td>4.33</td>
</tr>
</tbody>
</table>

Lecturers can manage the videoconferencing system with some difficulties. Setting up for a videoconference by the technician is straightforward but managing the session can have problems.

**Effectiveness of DE via videoconferencing**

This question was presented to the respondents in the form of a five-point scale. One criterion was defined with six aspects regarding the effectiveness of videoconferencing. Each aspect is defined as being part of the teaching process: (a) "lectures", (b) "seminars: students' participation", (c) "seminars: discussion", (d) "consultation with students" and (e) "group work". Each aspect of the teaching process was to be rated by the lecturers from "ineffective" to "very effective". An option of "not applicable (NA)" was also available. There were no negative responses. The most positive response was given to the aspect "lectures". Figure 5.11 illustrates this result.

**a) Effectiveness of videoconferencing for lectures**

The figure (5.11) illustrates that the lecturers expressed a slightly positive opinion (mean = 3.62) about the effectiveness of videoconferencing regarding 'lectures'. The majority of the lecturers, five out of eight, found that videoconferencing was "effective" (value "4") for lectures.

**Figure 5.11: Lectures**

This figure (5.11) illustrates that the lecturers expressed a slightly positive opinion (mean = 3.62) about the effectiveness of videoconferencing regarding 'lectures'. The majority of the lecturers, five out of eight, found that videoconferencing was "effective" (value "4") for lectures.
b) Summary of the results regarding the effectiveness of videoconferencing

Table 5.8: Summary of the results regarding the effectiveness of DE via videoconferencing by the lecturers

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars: students participation</td>
<td>3.00</td>
</tr>
<tr>
<td>Seminars: discussion</td>
<td>3.00</td>
</tr>
<tr>
<td>Group work</td>
<td>3.16</td>
</tr>
<tr>
<td>Consultation with students</td>
<td>3.20</td>
</tr>
<tr>
<td>Lectures</td>
<td>3.62</td>
</tr>
</tbody>
</table>

The shaded row indicates the most meaningful response presented in this section.

Satisfaction with videoconferencing

Figure 5.12 illustrates that the lecturers had different opinions about their level of satisfaction with videoconferencing. Their opinions were slightly positive (mean = 3.66). This was closer to the value "4" ("somewhat satisfied"), rated by four out of nine respondents. Therefore, the overall result of their level of satisfaction is approximated to "somewhat satisfied".

Of the six lecturers who commented, three were "somewhat satisfied" with videoconferencing. The reasons for these lecturers being "somewhat satisfied" were the lack of assuring technical reliability, students not having videoconferencing facilities and that videoconferencing was suitable for short presentations but not for discussions. The first explanation refers to the technical issues, the second refers to the use of PC desktop videoconferencing which requires that students have the facility at home, the latter, refers to the pragmatic role of the videoconferencing for aspects of their teaching process. One lecturer, who expressed a neutral opinion, commented that he/she feels that he/she could "do better in the future. You cannot just read a lecture in a normal way. You have to be animated, ask questions and keep alert". He/she complemented his/her comment by adding that "this is especially so, if they (i.e. the students) are attending after work". On the other hand, one of the lecturers who was "somewhat dissatisfied" explained that there was a "lack of dialogue due to fuzzy pictures and poor sound quality" and the lecturer who was "dissatisfied" explained that videoconferencing was particularly inappropriate for the material he/she teaches (syntactic analysis). The very static nature of videoconferencing makes it impossible to use the "on the spot, chalk and talk", techniques that work very well in traditional settings. This lecturer provided a valuable clue on one of the psychological/emotional aspects of the videoconferencing teaching process by adding that "it is much harder also to have the students being active in class when you can't go round the class and give them individual attention". This view suggests that the students are likely to feel bored by attending a videoconferencing lecture, an issue to be examined in section 5.5: the analysis of the students' responses.
5.4.4 Acceptability of DE via videoconferencing

To conclude the analysis of the lecturers' responses, the next sections present the analysis of the acceptability of DE via videoconferencing by the lecturers. One of the very basic questions to ask the lecturers is: "Was DE via videoconferencing a good way of teaching?" When they were asked this question, the majority, seven out of nine of the responses were positive. Nevertheless, there were two lecturers whose views were negative. Of the seven lecturers who thought that videoconferencing was a good way of teaching, five reported their comments. These fall into three categories:

(a) Pragmatic: of the five lecturers, who expressed their comments, three gave a pragmatic evaluation. One lecturer found that it was the only way he/she could offer a close substitute to traditional education. Another lecturer explained that it saves time that can be better spent on other matters. The third lecturer thought that videoconferencing was useful when there was no other alternative.

(b) Student centred: one lecturer expressed a student centred comment. He/she focused his/her explanation for having a positive attitude towards videoconferencing because it provides access to students who could not attend classes on a distant campus.

(c) Academic: there was one lecturer whose explanation for having a positive attitude focused on the academic aspect of this different way of teaching. He/she commented that "it forces one to re-consider one's approach to all aspects of one's teaching: preparation, goals, and methods".

The comments from the two lecturers who did not think that videoconferencing was a good way of teaching were both focused on the communicational aspect of the videoconferencing teaching process. Communication is one of the aspects of interaction which was referred to, by these two lecturers, as being non-existent in videoconferencing settings.

Lecturers preferences (traditional education or DE)

Five out of nine lecturers chose traditional education while only two lecturers chose DE and the other two lecturers from this sample chose dual mode of instruction. Lecturers whose choice was traditional education had various reasons. Their comments fall into four categories:

(a) Technical limitations: one of the lecturers attributed his preference for traditional education to the technical limitations of the videoconferencing system used.

(b) Psychological/emotional: one of the lecturers said that videoconferencing makes the teaching experience rather formal which leads to boredom for the lecturers themselves and the students.

(c) Pragmatic: two lecturers had a pragmatic reason for preferring traditional education. One of them pointed out that this was the only option available to reach students who could not otherwise attend classes. The other lecturer whose view was pragmatic explained that, for the subject being taught (syntax), traditional education was more suitable.

(d) Communication: one of the lecturers reported that traditional education offered higher levels of effectiveness for communication.

Of the two lecturers whose choice was DE, only one reported his/her comment. He/she emphasized the pragmatic aspect for teaching at a distance, that traditional education requires "constant travelling in rural areas which have poor roads". Of the two lecturers whose choice was both, traditional education and DE, only one reported his/her comment. He/she pointed out that "the ideal is for students to benefit from a dual mode delivery".

The way lecturers see DE and the videoconferencing classroom

Lecturers were asked to complete the sentence about the way they perceive the videoconferencing classroom. Four options of answers were available (Livingston & Robinson, 1992): (a) "an alternative to the usual classrooms", (b) "a substitute for main classrooms", (c) "an attempt to simulate normal classrooms" and (d) "others, please specify".
Seven lecturers out of nine chose one of the named three options. One lecturer did not answer and the other one added his/her own view: "An attempt to stimulate normal classroom experience". Of the seven lecturers whose view was one of the three options available, three lecturers saw the videoconferencing classroom as "an alternative to the usual classroom" and three other lecturers saw it as "an attempt to simulate normal classroom". Only one lecturer chose the option "a substitute for main classrooms".

The same procedure was carried out when the lecturers were asked to complete the sentence: "Do you see the distance education as". Four options of answers were available: (a) "an alternative to traditional education", (b) "a substitute for traditional education", (c) "an attempt to simulate traditional education" and (d) "others, please specify".

Seven lecturers out of nine chose one of the named three options. The two lecturers whose views were different from those options reported that he/she saw DE as being (1) "a supplement to traditional education" and added the word "enrichment" to one of the options (2) "an alternative and an enrichment to traditional education". Of the seven lecturers whose view was one of the three options available, the majority (five) saw DE as being "an alternative to traditional education". Only two saw DE as being "an attempt to simulate traditional education".

Subject matter and activity for DE via videoconferencing

Lecturers' responses to the question about the appropriate subject matter and activity for DE via videoconferencing were diverse. Thus, a first level analysis of these answers demonstrated that they fall into five categories:

- Presentations
- All types of subject matter
- Text-based, i.e. lectures
- Less technical material
- I do not know

Meeting lecturers' expectations

Lecturers were asked to report whether or not their expectations were met. Only one of the nine lecturers did not have his/her expectations met. He/she attributed the fact that his/her expectations were not met, to the lack of dialogue with students. The overall outcome was positive. Eight out of nine of the surveyed lecturers had their expectations met. Their comments are categorized into the following:

(a) Positive feedback: one of the lecturers based his/her arguments on the fact that he/she was receiving positive feedback from lecturers and students. Another comment under this category was that one of the lecturers had his/her objectives met.

(b) Pragmatic: one of the lecturers commented that his/her expectations were met but they were quite low (e.g. saving travel time).

(c) Academic: one of the lecturers reported his/her reason for having the expectations met from an academic perspective. He/she pointed out that DE via videoconferencing provided lecturers and students with ICT skill's development.

Lecturers would teach via videoconferencing again

The answers given to the question about whether the lecturers would teach via videoconferencing again were unanimously positive. All the surveyed lecturers would teach another DE course via videoconferencing again for a variety of reasons. One of the lecturers would do so with the condition that the studio would have to have proper facilities, "possibly, video links by PC". Another pragmatic kind of reason was mentioned by another lecturer: "will continue to save time". Two other lecturers mentioned that the reason for their continuation of teaching at a distance via videoconferencing was to continue their "own professional development" and other possibilities besides teaching languages. A positive reason for continuing teaching at a distance via videoconferencing, was mentioned by the former manager of the central system (i.e. videoconferencing) and current lecturer who "believes in
videoconferencing" due to his/her experience gained over eight years as a system manager in this University. Another positive comment was expressed by a lecturer who thinks that this was "fine" for the material he/she was using.

Further comments or issues

Less than a half of the surveyed lecturers added further comments or issues. The original responses given by the lecturers are categorized as follows:

(a) Technical recommendations: one of the lecturers suggested that videoconferencing should be used in all lecture theatres to lower costs and that the bandwidth should be increased to provide better images.

(b) Academic: as mentioned in section 5.4.1 (lecturers' expectations), this category is associated with the lecturers' comments when these refer to the use of DE via videoconferencing as being the subject of research itself. For instance, one lecturer expected that he/she has to explore the full potential of videoconferencing, in particular, for interactive discussion.

(c) Pragmatic: as mentioned in section 5.4.1 (lecturers' expectations), this category is associated with the lecturers' comments when these refer to the use of DE via videoconferencing as being the benefits DE can offer to practical matters. From a pragmatic perspective, one of the lecturers commented that "funding has to be directed towards experimentation and purchase of latest technology, the profile of videoconferencing has to be raised in every way".

(d) Problem-solving: this category is typically related to the "pragmatic" one as mentioned before (section 4.1.1, lecturers' expectations). This happens because some of the lecturers' comments are about DE solving practical matters. For instance, one of the lecturers mentioned that: "for school pupils, distance teaching is not a substitute for face-to-face teaching, merely an enrichment but I would also encourage its wider use for local communities, particularly in remote areas".

5.5 Students' responses to videoconferencing

This section presents the analysis of the students' responses to videoconferencing. Both samples (A, n=31 and B, n=5) are analysed separately but presented in this section. A comparison of the data is then provided.

5.5.1 Students' background

Sample A:

The students' age group was predominantly twenties (71%). Nearly twenty percent of the students surveyed were in their late teens. Only two students out of 31 were in their thirties and one student was in his/her forties. The majority of the respondents was female (67.74%). Most of the students (70%) were studying for a Bachelor's degree specifically BSc., while one third of the students were studying for a Master's degree. The majority of the students were (93.55%) enrolled as full-time students. The two students out of 31 who were part-time were working in the service sector. All of them reported that they were experiencing videoconferencing for the first time. All of the students were white/Anglos and there were only three students (9.68%) for whom English was not the first language.

Sample B:

Students' background is reported so that the general picture about the sample B is clearly understood. Even though this sample is relatively small if compared with sample A, sample B represents a reasonable rate of over one third of the population (about 15 students) currently enrolled at a videoconferencing class at the time of this survey who had previous experience with this way of learning. Three out of five respondents were in their twenties and two respondents were in their thirties. Their ethnic background was white/Anglos and English was their first language. Their gender was well distributed: three were male and two females. They were all full-time and studying for a Bachelor's degree (BSc). Students' first experience with learning at a distance via videoconferencing varied, but nevertheless, they were not having this experience for the first time. Most of them (four out of five) had had their first DE course via videoconferencing within the past two years of this survey. Of these four, two specified when:

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"June 1998", (2) "September 1998". The respondents who had taken the DE course through videoconferencing for the first time within two and five years specified that it was in June 1997. Despite the fact that they were full-time students, one of them was also working in the clerical sector.

**Students' expectations**

**Sample A:**

Students were asked to provide their expectations. The response rate to this question was 80.65%. After a first level analysis was completed, some of their answers were relevant but there were a number of unsuitable answers given due to the fact that a significant number of the respondents did not know that the course was going to be at a distance through videoconferencing. Their expectations could be categorized as follows:

(a) Academic: this category refers to the students' expectations when these are associated with the use of DE through videoconferencing as being the subject of study itself. For instance, one of the students wanted to compare how his/her subject matter is taught at a British University since he/she studied in Germany. Another student expected to learn how to use the videoconferencing system and become confident in using it.

(b) Pragmatic: from a pragmatic perspective, students expected to pass the exams required, to complete their course successfully, and to get their degrees.

(c) Personal aspirations: one of the students expected to gain experience from distance learning, which could also be a kind of "academic" expectation, while another one expected to become more competent in the subject matter he/she was studying and to learn computer skills.

(d) Optimistic: two comments indicated that these students had an optimistic attitude towards DE via videoconferencing. One of them "thought it was an excellent way to be taught instead of missing out the module because of lack of lecturers". Another student was looking forward to doing it, he/she thought it would be "an exciting way of learning."

(e) Pessimistic: one of the students had a rather pessimistic attitude towards DE via videoconferencing. He/she "did not think that it would work but it suits small classes".

(f) Comparison: this category refers to the students' comments when they compare DE via videoconferencing with the traditional way of learning. For example, one of the students expected "that it would approximate as closely as possible to a normal lecture".

(g) No expectations due to the lack of awareness that the course was at a distance and through videoconferencing: ten out of 25 students did not have any previous knowledge that their lectures would be at a distance via videoconferencing.

**Sample B:**

Students were asked to report their expectations which include their ambitions, desires and needs. There was one student who did not comment anything, however, the four students who reported their comments had rather "pragmatic", "problem-solving" and "comparative" kinds of expectations.

From a pragmatic perspective, students expected to "learn the subject being taught", "to pass the class" and "to be taught a subject which is not very widely taught with the nearest teacher 70 miles away". This last comment also falls into the "problem-solving" category. From a "comparative" perspective, one of the students expected "that it would be interesting to see the difference between this and one-to-one (face-to-face) teaching".
Reasons for learning at a distance via videoconferencing

Sample A:

There were 24 answers to the question about the students' reasons for learning at a distance via videoconferencing (a response rate of 78.42%). Nevertheless the answers indicated the lack of awareness by the students. They did not know that they were enrolling in a DE course via videoconferencing. Another indication given by their comments was that they would rather prefer to be aware beforehand. However, this fact may be an indication of management issues by the University.

Sample B:

Every respondent answered the question about reasons for learning at a distance. However, the answers revealed the lack of awareness by the students. They did not know that they were enrolling in a DE course via videoconferencing. Not surprisingly, another indication given by their comments was that they would prefer to be aware beforehand. By comparison, the outcomes are the same as found in sample A.

5.5.2 Usage of videoconferencing for DE

Students' role when learning at a distance via videoconferencing

Regarding the students' role, there were four options that were based on the results acquired in the previous survey, the case study A (chapter 4):

- "I have to be more independent and have self-control"
- "I have to be more self-disciplined"
- "I have to work twice as hard" and
- "Others"

Each of these roles was available to be rated with a scale from 1 = "Very important" to 5 = "Not important at all". "Not applicable (NA)" was also an option in the scale. The distribution of the results is illustrated by each chart built for each student's role. Table 5.9 summarizes these results.

a) Summary of the results

Table 5.9: Students' new role when learning at a distance via videoconferencing

<table>
<thead>
<tr>
<th>Students' role</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have to be more independent and to have self-control</td>
<td>1.53</td>
<td>2.50</td>
</tr>
<tr>
<td>I have to be more self-disciplined</td>
<td>1.63</td>
<td>2.50</td>
</tr>
<tr>
<td>I have to work twice as hard</td>
<td>2.13</td>
<td>3.25</td>
</tr>
<tr>
<td>Others</td>
<td>No data</td>
<td>No data</td>
</tr>
</tbody>
</table>

Results from sample A revealed that the most important role was to be more independent and to have self-control over their own learning. Moreover, the results indicated that all these three roles were considered to be important to the respondents. Results from sample B indicated that the most important role was (1) "to be more independent and to have self-control" over their own learning and (2) "to be more self-disciplined". Moreover, the results indicated that all these three roles were considered to be important to the respondents since the means were very low which does not differ from the results found in sample A. The prominent difference was that the more experienced students rated their roles as being more important than the students who were learning at a distance for the first time.
General problems with distance learning via videoconferencing

Students were asked to rate the following range of options distributed among three aspects, (a) "workstation", (b) "environment" and (c) "organization", according to the rating scale as follows:

- "1 = Too problematic"
- "2 = Very problematic"
- "3 = Problematic"
- "4 = Somewhat problematic" and
- "5 = No problem at all"

(a) **workstation:**
- Furniture (i.e. desk)
- Dimensioning of the furniture
- Chair
- Foot rest
- Tools' location
- Position of cameras and monitors
- Video quality
- Audio quality (i.e. overlapping voices)
- Fax machine
- Seating arrangement

(b) **Environment:**
- Illumination
- Temperature
- Noise
- General layout
- Location

(c) **Organization:**
- Content of the subject matter
- Structure of the course
- Teaching material
- Communication
- Timing and synchronization

This section was included in the questionnaire for the students because they take videoconferenced classes from the videoconferencing lecture room based on campus. This unique distinction led to the inclusion of a section that could capture the general problems that students face with the ergonomics of the videoconferencing lecture room and the organization of the course. The original format of this section was kept the same on the questionnaire form. Therefore, the coherence with the other rating scales on the questionnaire form is assured. The general outcome was remarkably positive and the summary of the results is outlined in the next sections:

a) **Problems related to the workstation - physical installations of the videoconferencing lecture room**

This section is divided into ten aspects, as listed above. For each aspect the mean was calculated. The summary of the results is shown in table 5.10:

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean(A)</th>
<th>Mean(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio quality (i.e. overlapping voices)</td>
<td>4.22</td>
<td>4.60</td>
</tr>
<tr>
<td>Foot rest</td>
<td>4.48</td>
<td>5.00</td>
</tr>
<tr>
<td>Video quality</td>
<td>4.52</td>
<td>4.60</td>
</tr>
<tr>
<td>Fax machine</td>
<td>4.71</td>
<td>5.00</td>
</tr>
<tr>
<td>Chair</td>
<td>4.84</td>
<td>5.00</td>
</tr>
<tr>
<td>Seating arrangement</td>
<td>4.84</td>
<td>5.00</td>
</tr>
<tr>
<td>Dimensioning of the furniture</td>
<td>4.87</td>
<td>5.00</td>
</tr>
<tr>
<td>Tools' location</td>
<td>4.90</td>
<td>5.00</td>
</tr>
<tr>
<td>Position of cameras and monitors</td>
<td>4.93</td>
<td>5.00</td>
</tr>
<tr>
<td>Furniture (i.e. desk)</td>
<td>5.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>

Table 5.10 indicates that the respondents rated positively the physical installation of the videoconferencing lecture room and there is no significant difference between the samples.

b) **Problems related to the environment**

This section is divided into five aspects of the environment as listed above. For each aspect, the mean was calculated and the summary of the results is shown in table 5.11:
Table 5.11: Problems related to the environment

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>4.48</td>
<td>4.80</td>
</tr>
<tr>
<td>Noise</td>
<td>4.73</td>
<td>4.80</td>
</tr>
<tr>
<td>Location</td>
<td>4.90</td>
<td>5.00</td>
</tr>
<tr>
<td>General layout</td>
<td>4.93</td>
<td>5.00</td>
</tr>
<tr>
<td>Illumination</td>
<td>4.97</td>
<td>5.00</td>
</tr>
</tbody>
</table>

Table 5.11 indicates that the respondents were not having difficulties with the environment. The outcomes were both (samples A and B) very similar and positive.

c) Problems related to the organization of the videoconferencing course

This section is divided into five aspects. For each aspect the mean was calculated and they are shown in table 5.12:

Table 5.12: Problems related to the organization of the videoconferencing course

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>4.13</td>
<td>4.00</td>
</tr>
<tr>
<td>Structure of the course</td>
<td>4.33</td>
<td>4.40</td>
</tr>
<tr>
<td>Timing and synchronization</td>
<td>4.33</td>
<td>4.00</td>
</tr>
<tr>
<td>Content of the subject matter</td>
<td>4.37</td>
<td>4.20</td>
</tr>
<tr>
<td>Teaching material</td>
<td>4.43</td>
<td>4.20</td>
</tr>
</tbody>
</table>

There were no negative outcomes from both samples. However, special attention can be paid to the less positive outcome from sample A (mean = 4.13) "Communication", even though this value is still higher than the value "4" which means "somewhat problematic". The less positive outcomes from sample B (mean = 4.00) were "communication" and "timing and synchronization" which were considered to be "somewhat problematic" by the more experienced students. Having analysed all the aspects associated with the students’ usability of DE through videoconferencing, the next section presents the analysis of the responses to the methods of contact with lecturers.

Main methods of contact with lecturers

Sample A:

Seven options were available for this question: (a) "e-mail", (b) "videoconferencing", (c) "telephone", (d) "WebBoard", (e) "fax", (f) "face-to-face meetings" and (g) "others". The students were asked to choose the methods of contact with lecturers from this range of options. Not surprisingly, the analysis of the responses indicated that the most common method of contact was videoconferencing followed by e-mail. Despite the fact that all the surveyed students had taken videoconferencing classes, 20 of these 31 students (64.52%) reported that e-mail and videoconferencing were their main method of contact with their lecturers. Videoconferencing was used by 23 students (74.19%) as their main method of contact. The option "face-to-face meetings" was in the third place. It was used by 14 (45.16%) of the surveyed students. The options, "fax" and "others" were not completed by any of the students, while telephone was used by two students (6.45%) and WebBoard by only one student (3.23%).

Sample B:

The five respondents of this sample answered unanimously to this closed-ended question with the following six options of answers: (a) "e-mail", (b) "videoconferencing", (c) "telephone", (d) "WebBoard", (e) "face-to-face meetings" and (f) "others" in case a student contacts the tutor differently from the options available. Not surprisingly, the results were similar to the ones of the sample A. The students contact lectures through e-mail, videoconferencing and face-to-face meetings.
Frequency of use of the means of communication during DE via videoconferencing

In order to investigate the frequency of use of several means of communication, students were asked to provide the frequency with which they used the several means of communication listed table 5.13.

**Table 5.13: Frequency of use during the course**

<table>
<thead>
<tr>
<th>Items used</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice-mail (answer machine)</td>
<td>1.03</td>
<td>1.00</td>
</tr>
<tr>
<td>Express mail (fast delivery)</td>
<td>1.07</td>
<td>1.00</td>
</tr>
<tr>
<td>Pager</td>
<td>1.10</td>
<td>1.00</td>
</tr>
<tr>
<td>Fax</td>
<td>1.17</td>
<td>1.00</td>
</tr>
<tr>
<td>Chat room on the Web</td>
<td>1.30</td>
<td>1.00</td>
</tr>
<tr>
<td>Royal mail</td>
<td>1.80</td>
<td>1.40</td>
</tr>
<tr>
<td>Telephone</td>
<td>2.27</td>
<td>1.00</td>
</tr>
<tr>
<td>Face-to-face meetings with tutor</td>
<td>2.40</td>
<td>2.33</td>
</tr>
<tr>
<td>Printer</td>
<td>3.77</td>
<td>1.80</td>
</tr>
<tr>
<td>Videoconferencing</td>
<td>4.07</td>
<td>5.20</td>
</tr>
<tr>
<td>E-mail (files transfer and messaging)</td>
<td>4.70</td>
<td>3.40</td>
</tr>
<tr>
<td>Face-to-face meetings with colleagues</td>
<td>5.03</td>
<td>4.20</td>
</tr>
</tbody>
</table>

- (1) "do not use/ not available"
- (2) "every three months"
- (3) "once per month"
- (4) "twice per month"
- (5) "every week"
- (6) "every three days"

The analysis of the results from sample A and the calculation of the mean indicated that the most frequent item used was not surprisingly, face-to-face meetings with their colleagues followed by e-mail and videoconferencing. The most frequent item used by students from sample B was not surprisingly but nevertheless quite different from the results of sample A: the first was videoconferencing, the second was face-to-face meetings with their colleagues followed by e-mail. Two respondents from sample B included, on the list of frequency, the option "once a year". Despite this not being available as one of the ratings provided for the frequency of use, these respondents reported that they meet the tutor, on a face-to-face basis, only once a year. This is an indication that the more experienced students did not find that meeting "once a year" was sufficient. Having detected their main methods of contacting their lecturers, the next step was to investigate the problems with each method of contact.

**Main problems with each method of contact with lecturers**

Not every respondent reported the problems with each method of contact (i.e. e-mail and videoconferencing). However, the ones who did, provided valuable information. These comments were summarized into four major categories: psychological, communicational, technical and organizational (table 5.14).
Table 5.14: Main problems with method of contact with lecturers

<table>
<thead>
<tr>
<th>Sample</th>
<th>Psychological</th>
<th>Communicational</th>
<th>Technical</th>
<th>Organizational</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>- Impersonal</td>
<td>- Takes time to receive reply</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Inability to check it regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td></td>
<td>- Response time is slow due to time required to reply</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>messages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video-</td>
<td>(A)</td>
<td>- Being interrupted in mid sentence at the end of</td>
<td>- Equipment does not work properly</td>
<td>- The system being booked by another</td>
</tr>
<tr>
<td>conferencing</td>
<td></td>
<td>class</td>
<td>sometimes</td>
<td>lecturer previously</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of communication outside the lecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The link is switched off automatically at the end</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>of lecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hard to express</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Have to speak louder than usual</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The lecturer cannot assist students' work</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>individually in class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Feedback is difficult</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hard to communicate with lecturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Difficult to understand lecturer's speech</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>- Lack of human contact</td>
<td>- Breakdown of communication</td>
<td></td>
<td>- Number of face-to-face meetings is insufficient</td>
</tr>
<tr>
<td>Face-to-face meetings</td>
<td>(B)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not surprisingly, most of the problems with the method of contact with lecturers were referring to the communicational aspect, although there was a significant number of technical problems with the use of videoconferencing as a means of contacting the lecturers. Communication is one of the most important aspects of interaction, since this has been problematic by the students and the lecturers, their level of satisfaction is certainly affected by both these kinds of problems, communicational and technical. This is specially so when using e-mail and videoconferencing for contacting the lecturers. These results also revealed that the more experienced students were not satisfied with the number of face-to-face meetings with their lecturers.

Technical support

Sample A:

Technical support is another factor to be investigated as it affects the students' usability level. Students were asked whether or not they were having enough technical support. There were three options: "yes", "no" and "sometimes". However, this was not as critical as it was for the lecturers since they were not the ones dealing directly with the technical equipment for videoconferencing. When the students are attending a videoconferenced lecture by themselves, in other words, when the lecturer is located at the other campus, they might experience technical difficulties. Their comments reveal what actually happens in this situation. Most of the students (64.52%) commented that they were having enough technical support. Nine out of 31 respondents (29.03%) answered that they were having enough technical support sometimes and only two students were not having enough support. All the students who were receiving enough technical support explained that the technician(s) was(were) always available.

Students who were not having enough technical support explained that the technical support was inefficient and that the technician was not available. Of the nine students who were having enough technical support sometimes,
four reported that the technician was not always available. Nevertheless, the overall outcome was positive since 64.52% of the respondents expressed a positive attitude towards the technical support.

Sample B:

The outcomes were, not surprisingly, very similar to the ones from the sample A. Two out of five respondents reported that they were having enough technical support. Two other respondents were having enough technical support sometimes and only one student was not having enough technical support. One of the students who were having enough technical support commented that: "the technical support office is just down the stairs or a phone call away". One of the students who was having it sometimes explained that they: "have to learn to use the system on their own, not supervised at all to be shown buttons to press, etc. (intimidation occurs)". The student who was not having enough technical support did not report his/her comments.

Table 5.15: Technical support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Somewhat positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses (A)</td>
<td>20</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Number of responses (B)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Learning support from lecturers

Sample A:

Students were asked whether or not they had enough learning support from lecturers. Options were "yes", "no" and "sometimes". An open space was provided to encourage respondents to explain their answers.

Most of the respondents (21 out of 31, 67.74%) were having enough learning support from their lecturers. Six (19.35%) students were having enough learning support sometimes and only four students were not having enough support. Not every respondent expressed their comments, but nevertheless there were ten comments from the students who were having enough learning support. They explained that lecturers were always willing to help and available to be contacted. The four students who were not having enough learning support explained that the "supervisor is very busy" and not always available. The lack of their physical presence is impersonal and frustrating. Of the six students who were having enough learning support sometimes, five commented that it was difficult to contact the lecturer since contact by e-mail was not the same as personal contact. Communication is not as effective as it is when there is personal contact, class members are reluctant to communicate through videoconferencing. As a general conclusion, students' comments indicate that communication was the main unresolved issue in terms of learning support.

Sample B:

The outcomes were slightly less positive than the ones found in sample A, but nevertheless they were not negative at all. Two out of five respondents reported that they were having enough learning support and two other respondents were having it sometimes. Only one student was not having enough learning support. One of the students who were having enough learning support from his or her lecturer commented that the lecturer "talks us through the steps needed to do the job". One of the students who were having learning support sometimes explained that: "questions difficult to understand from lecturer but because of use of language not the system, one-to-one (face-to-face) is always best". The student whose answer was negative explained that no training about using the videoconferencing system controls was supplied.

Table 5.16: Learning support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Somewhat positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses (A)</td>
<td>21</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Number of responses (B)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Specific recommendations about the usage of videoconferencing for distance learning

Sample A:

Students' original comments were categorized. Their recommendations about the use of videoconferencing fall into eight categories:

(a) Psychological: this category includes the students' comments from a psychological point of view. For instance, one of the students commented that one should not be "scared of the equipment" while another student reported that "it takes a while to get used to".

(b) Pragmatic: this category refers to the students' comments when they are related to practical matters. This is typically associated with the "problem-solving" category since they make recommendations to their practical issues. For instance, one of the students recommended that it would be better if they could meet with the lecturer more often. Another student suggested that it would be better for lecture purposes only but not for discussion groups. By contrast, another student suggested that it should be used more for meetings rather than teaching. Moreover, there was a revealing comment that not only indicated the problem but also suggested how to solve it: one of the students recommended that "the first class should have a member of staff to introduce the tutor at other end (e.g. it is very intimidating at first and this feeling continues)".

(c) Problem-solving: since it was mentioned previously that this kind of category is normally associated with the "pragmatic" one, there are, not surprisingly, some overlaps among the students' comments under both categories. For example, one of the students suggested to meet with the lecturer more often because there were a number of students who were not entirely satisfied with the frequency of face-to-face meetings with their lecturers. This happens due to: firstly, the fact that students did not know beforehand that they were enrolling themselves in a course at a distance via videoconferencing and so they would expect to see the lecturer more often and secondly, to the fact that students in this sample (A) were experiencing DE via videoconferencing for the first time so that any aggressive change causes negative reaction. Another student suggested that it should not be used for discussion groups ("pragmatic" also). Another example of "problem-solving" kind of comment is the student who negatively mentioned: "get rid of it, for teaching, only useful for business, when people are supposed to meet but can't". One of the students suggested that "the lecture outline should possibly be introduced before the videoconferencing sessions so that it would reduce confusion for some and another one mentioned the need of more time. These comments (could also be classified under the "pragmatic" kind of recommendation) indicate that they based their recommendations on aspects that cause problems. As a result, these also provide solution for these problems. The last comment under this category is a recommendation by the student who suggested that "the first class should have a member of staff to introduce tutor at other end (e.g. it is very intimidating at first and this feeling continues)" (also a "pragmatic" kind of recommendation).

(d) Technical improvements: there were two recommendations in which technical improvements are suggested: (1) "larger screens, so lecture notes can be read more clearly" and (2) "make sure everything is definitely working perfectly first" (also a "pragmatic" kind of recommendation).

(e) Business opportunities: this category refers to the students' recommendations when they are normally associated with their comments in terms of what they would like to use videoconferencing for. For instance, there was only one student who expressed such attitude towards the use of videoconferencing. He/she recommended that he/she "would use it to conduct meetings involving company staff working in different countries".

(f) Student centred: this category refers to the students' comments when they are directly associated with their own interests and role as a student. For example, one of the students advised that one should "encourage students from the beginning that they need to take notes regularly and participate to get any knowledge across".

(g) Optimistic: this category includes the students' comments when they expressed a positive attitude towards the use of videoconferencing. There was only one student whose comment falls into this category. He/she mentioned that "it is good to experience it".

(h) Pessimistic: there was only one student whose view was rather negative. He/she commented that videoconferencing was "only useful for business, when people are supposed to meet but can't" (also under the "problem-solving category").
According to the last two "psychological" kind of recommendations, the first comment is an indication that the videoconferencing equipment can be intimidating and the second comment suggests that learning at a distance through videoconferencing successfully is a matter of getting used to this different way of learning. This leads to the assumption that: firstly, new technologies, or the introduction of a rather different technology, requires a certain level of adaptation by its stakeholders and secondly, better implementation strategies (i.e. induction sessions on several basic aspects of DE and videoconferencing) and a certain degree of experience are determinant factors of a successful DE programme. Moreover, this view was supported and therefore confirmed by the last students' comment under the "pragmatic" and the "problem-solving" categories.

Sample B:

Their recommendations were very similar to the ones reported by the students of sample A. These are categorized into the following:

(a) Pragmatic and problem-solving: from these two perspectives, students recommend to have a meeting with the tutor and the class at the start of the course so that videoconferencing would be less intimidating for the first time users.

(b) Technical improvements: from a technical point of view, one of the students recommended to use larger screens and that instructions on how to send images and text documents should be easily available in an accessible location.

5.5.3 Usability of videoconferencing for DE

Students' impressions about using videoconferencing

To capture a more detailed range of usability issues, this section was included in the students' questionnaire. In spite of students not being directly in contact with some of the aspects regarding the videoconferencing equipment usage, they were kept on the questionnaire form. For this reason, there were a number of ratings as being "NA = not applicable". Even though it is worth measuring their usability impressions so that they can be contrasted with sample B. There were seven aspects available. Each aspect had a different criterion to be rated by the students. The next section lists these aspects and their respective criteria:

a) Determining the focus of attention during conference was: "confusing" = 1 to "clear" = 5.

b) Video image flow: "choppy" = 1 to "smooth" = 5

c) Focus of video image: "fuzzy" = 1 to "clear" = 5

d) Audio output: "inaudible" = 1 to "audible" = 5

e) Audio is in synchrony with video image: "never" = 1 to "always" = 5

f) Learning to operate the system: "difficult" = 1 to "easy" = 5

g) Getting started: "difficult" = 1 to "easy" = 5

There were no negative outcomes. Students' impressions were, on average, unanimously positive. Table 5.17 summarizes these responses:
Table 5.17: Summary of the results regarding the use of videoconferencing by the students

<table>
<thead>
<tr>
<th>Impressions about using VC</th>
<th>Criteria</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning to operate the system</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.22</td>
<td>3.20</td>
</tr>
<tr>
<td>Getting started</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.41</td>
<td>3.60</td>
</tr>
<tr>
<td>Determining the focus of attention during conference</td>
<td>&quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.52</td>
<td>4.00</td>
</tr>
<tr>
<td>Audio is in synchrony with video images</td>
<td>&quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.74</td>
<td>4.20</td>
</tr>
<tr>
<td>Audio output</td>
<td>&quot;inaudible&quot; = 1 to &quot;audible&quot; = 5</td>
<td>4.06</td>
<td>4.40</td>
</tr>
<tr>
<td>Video image flow</td>
<td>&quot;choppy&quot; = 1 to &quot;smooth&quot; = 5</td>
<td>4.07</td>
<td>4.00</td>
</tr>
<tr>
<td>Focus of video image</td>
<td>&quot;fuzzy&quot; = 1 to &quot;clear&quot; = 5</td>
<td>4.29</td>
<td>4.20</td>
</tr>
</tbody>
</table>

The shaded rows indicate the most negative and the most positive outcomes because they provide meaningful trends on the data: "learning to operate the system" by both samples, "audio output" by the students from sample B and "focus of video image" by the students from sample A. Both students who were experiencing DE via videoconferencing for the first time and the students who were more experienced with it rated "learning to operate the system" less positively. Even though students were not responsible for operating the system directly. There was no significant difference between the overall results from both samples A and B, regarding their impressions about using videoconferencing. However, the most experienced students (sample B) rated the audio output as being the most positive while the most positive result was given to the focus of video image by the students who were learning at a distance for the first time (sample A).

Effectiveness of DE via videoconferencing

Students were asked to rate the level of effectiveness of DE through videoconferencing according to the five-point rating scale from "ineffective" to "very effective" for five aspects of the learning process: (a) "lectures", (b) "students' participation", (c) "discussion", (d) "consultation with tutor: one-to-one" and (e) "group work". Despite most of the results being positive, the most negative outcome from sample A was about the level of effectiveness of DE by videoconferencing for consultation with tutor: one-to-one. In comparison with the responses of the sample A, the students of sample B had a rather more negative attitude towards the effectiveness of DE via videoconferencing. While in sample A, there were only two slightly negative outcomes, in sample B most of the outcomes were negative. Despite the relative small number of students in this sample (B), there were two slightly negative outcomes and two most negative ones (for "consultation with tutor" and for "group work"). See figures 5.13 and 5.14 respectively.

a) Effectiveness of videoconferencing for consultation with tutor

![Consultation with tutor](image)

Figure 5.13: Consultation with tutor

This figure (5.13) indicates that the students from sample A rated consultation with tutor: one-to-one negatively (mean = 2.71). Eight out of 26 respondents (30.77%) rated it as being "somewhat ineffective". Although
there were six respondents (23.08%) who rated it as being "very effective". There were three students who did not answer and two who thought it was not applicable. The students from sample B rated the effectiveness of DE via videoconferencing for "consultation with tutor" rather more negatively (mean = 2.0). Two students out of four, since there was one respondent who found that it was not applicable, rated it as being "somewhat ineffective" and another found it "ineffective".

b) Effectiveness of videoconferencing for group work

![Figure 5.14: Group work](image)

The effectiveness of videoconferencing for "group work" was rated negatively by the students from sample B (mean = 2.00). Not surprisingly, since the number of respondents is relatively small, the distribution of the responses from sample B was exactly the same as shown in figure 5.13. The next section summarizes the overall results from both samples.

c) Summary of the results

**Table 5.18: Summary of the results regarding the effectiveness of DE via videoconferencing by the students**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation with tutor: one-to-one</td>
<td>2.71</td>
<td>2.00</td>
</tr>
<tr>
<td>Group work</td>
<td>2.87</td>
<td>2.00</td>
</tr>
<tr>
<td>Discussion</td>
<td>3.21</td>
<td>2.80</td>
</tr>
<tr>
<td>Students' participation</td>
<td>3.29</td>
<td>2.80</td>
</tr>
<tr>
<td>Lectures</td>
<td>3.47</td>
<td>3.60</td>
</tr>
</tbody>
</table>

The shaded row indicates the most meaningful responses. Unlike the lectures' results, the students rated two aspects negatively: "consultation with tutor" and "group work". These results support the view that the crucial aspect of communication is still an unresolved issue when learning at a distance via videoconferencing.

**Satisfaction with videoconferencing**

Satisfaction, is also, by definition, one of the factors which, in conjunction with others, contribute to determine the students' usability level. Thus, students' level of satisfaction with DE through videoconferencing was measured by a five-point rating scale from dissatisfaction (=1) to satisfaction (=5).
Figure 5.15: Student's level of satisfaction with videoconferencing

The distribution illustrated in figure 5.15 clearly indicates that the overall outcome of the responses from sample A was quite positive (mean = 3.68). Nearly half (45.16%) of the surveyed students rated that they were "somewhat satisfied" with DE via videoconferencing. The number of respondents whose ratings were negative ("somewhat dissatisfied" and "dissatisfied") was small, only four out of 31 (12.90%). By contrast, the overall outcome of the responses from sample B was slightly less positive than the outcome from sample A (mean = 3.2) since there were two positive ratings: "satisfied" and "fairly satisfied" against only one negative "dissatisfied". The analysis of the students' comments is presented below.

Sample A:

The comments of the respondents whose ratings were positive, "fairly satisfied" and "satisfied" fall into five categories:

(a) Communication: one of the students based his/her arguments of being fairly satisfied with DE through videoconferencing on the communicational aspect. In his/her view, communication is slightly less effective than in traditional settings. Another student finds "face-to-face communication easier to understand".

(b) Comparison: one of the students explained that the reason for him/her being somewhat satisfied was the fact that, in his/her opinion, DE via videoconferencing was similar to "normal lectures".

(c) Technical limitations: one of the technical limitations that prevented this particular student from being satisfied, although he/she was somewhat satisfied with DE via videoconferencing, was the technical limitations of the videoconferencing technology. As reported, the videoconferenced channel is, sometimes, switched off automatically which interrupts the lecture before all the contents are covered. Another technical issue was mentioned by another student. He/she claims for better synchronization between overheads presentation and lecturers' talking.

(d) Psychological/emotional: one student based his/her argument of being fairly satisfied with DE via videoconferencing on the fact that it takes time to become accustomed to DE via videoconferencing.

(e) Optimistic: two students who were satisfied with DE through videoconferencing had an optimistic attitude towards learning at a distance. One of them pointed out that DE via videoconferencing was a good way of communication and the students were learning a great deal this way. The other student whose view was optimistic highlighted that there were no problems with lectures by videoconferencing.

Comments from the students who were neutral towards their level of satisfaction of DE via videoconferencing fall into three categories:

(a) Communication: one of the students pointed out that it would be easier if the course was taught traditionally. According to him/her, videoconferencing makes it difficult for the lecturer to interact with class.
(b) Technical limitation: one of the students explained that the reason for him/her being neither satisfied nor unsatisfied was due to the technical limitations of the videoconferencing. Specifically, the technical limitations refer to lack of perfect synchrony between images and voices, which was sometimes frustrating from this student's point of view.

(c) Organizational: one of the students, whose level of satisfaction was neutral, based his/her arguments from an organizational perspective. He/she highlighted that "videoconferencing is a good idea when done well". This view implies on the organizational aspect of implementing, managing and using videoconferencing.

As a result, four issues were the causes of lack of satisfaction by the students. These issues were: (a) technical limitations which lead to frustrations, (b) organizational, (c) communicational and (d) psychological/emotional issues. This latter refers to the human adjustments under the effect of the new technology/system. In other words, the fact that it takes time for the students to get used to attending videoconferenced lectures.

Sample B:

One of the students who rated it positively was satisfied with the videoconferenced way of learning. He/she explained that it "works well with little difference between normal classroom learning". Students who expressed a neutral attitude towards their level of satisfaction commented that: (1) "It's getting better after having done it for a year but it would have helped if there had been more contact in the first year, as it seems easier to learn when face-to-face" and (2) "Easier face-to-face for communication purposes; subject matter sometimes hard to follow using examples because of the screen size". The student who was dissatisfied explained that he/she "can't get proper explanation of material and examples. We need more face-to-face contact at the beginning of the semester, at least one and for introducing the equipment".

5.5.4 Acceptability of DE via videoconferencing

One of the aspects to be investigated, is whether or not DE via videoconferencing was a good way of learning. Students were asked whether DE through videoconferencing was a good way of learning. There were two options of answers: "yes" or "no" and a space to encourage the respondents to explain their answers.

Sample A:

The overall outcome was positive. Most of the students surveyed (63.33%) thought that DE via videoconferencing was a good way of learning. Of the students who have a positive attitude towards DE via videoconferencing, thirteen revealed their comments which include the following eight categories:

(a) Academic: there were three students whose comments fall into the "academic" category. Of these three, two students highlighted the expression "new/different way of communication". For example, one of the students emphasized that attending a videoconferenced lecture had been helpful since they (the students), were constantly learning a different way of communication. Another student pointed out that DE through videoconferencing provided the students with another "dimension to education".

(b) Psychological/emotional: three students based their arguments for agreeing with the fact that DE via videoconferencing was a good way of learning on the psychological/emotional aspects of their learning process. For instance, one of these students reveals a remarkable finding: he/she argued that DE via videoconferencing helps students to be less timid therefore more self-confident in speaking aloud and in using modern technology.

(c) Optimistic: one of the students had an optimistic attitude towards the videoconferenced way of learning. He/she commented that this was a new way of learning and that the most suitable lecturer was available to teach through this way. Another student commented that it allowed "for greater interaction between students and lecturers" (under the "communication" category as well). The last example of optimistic comment was that DE via videoconferencing was different and therefore it had novelty value which according to this student, keeps the students motivated (see "comparison").

(d) Pragmatic: from a pragmatic perspective, three students based their comments. For example, one of the students highlighted the effectiveness of videoconferencing in reaching a wider audience.
Communication: since communication is an essential factor that can determine the level of interaction and therefore the usability level of a system/technology, this category included the comment by the student who mentioned that DE through videoconferencing allowed "for greater interaction between students and lecturers", as mentioned before under the "optimistic" category. Another student agreed with DE via videoconferencing being a good way of learning, with the condition that, despite few problems, students should contact the lecturer regularly (see "student centred" category).

Comparison: ultimately, students emphasize the comparison between traditional education and DE in order to argument their opinions. Thus, for example, one of the students pointed out that DE via videoconferencing was different and therefore it had novelty value, which according to him/her it keeps the students motivated, as mentioned before under the "optimistic" category. One of the students reported that they were still able to contact the lecturers similarly to the traditional settings.

Student centred: one of the students based his/her arguments for agreeing with the fact that DE through videoconferencing was a good way of learning on a recommendation for other students, with the condition that, regardless of a few problems, students should contact the lecturer regularly, as was mentioned previously ("communication" category). Another example was the one mentioned by one of the students that DE via videoconferencing works but it does help if the lecturer could visit the class more" (see "problem-solving" category). This comment, like others, supports the assumption that students were dissatisfied with the number of face-to-face meetings with the lecturer.

Problem-solving: as it was mentioned before ("student centred category), one of the students highlighted that DE via "videoconferencing works but it does help if the lecturer could visit the class more".

Students who did not think that DE via videoconferencing was a good way of learning explained that:

(a) Psychological/emotional: one of the students felt that he/she would prefer learning traditionally as in his/her opinion, it was “very awkward” using videoconferencing all the time. The last comment that falls into this category emphasizes the fact that there was no replacement for the physical presence of the lecturer in the lecture room.

(b) Communication: for example, one of the students pointed out that it was not as supportive as traditional lectures due to the lack of the physical presence of the lecturer (under the "comparison" category as well). Another example of communicational issue that contributed to the negative attitudes of some students was the students' lack of time to talk to the lecturer, in person, about problems. Another student pointed out that it had been 'hard to express ideas' to the lecturer.

(c) Comparison: one of the students stressed that it was not the same as "personal one-to-one tutorials". The last example was that, one of the students highlighted that it was not as supportive as traditional lectures due to the lack of the physical presence of the lecturer, as mentioned before ("communication" category).

It became evident that there are clear overlaps among different categories. This is attributed to the fact that multiple aspects of the interpretation of the comments are very likely to happen as they are typically correlated. Moreover, an aspect that is increasingly becoming more evident is the fact that from a psychological/emotional perspective, students feel "awkward" when learning through videoconferencing, as they are not used to it, which contributes to the difficulty of the students in expressing their ideas through videoconferencing. This comment supports the view that students feel intimidated by the videoconferencing technology although some of them approach this more positively and thus, by contrast, they acquire more confidence in using new technologies.

Sample B:

Unlike the results of the sample A, the more experienced respondents had a rather negative attitude towards this question. Three out of five respondents did not think that DE via videoconferencing was a good way of learning. One respondent commented that he/she "did not know" and only one answered "yes". There was only one student, whose answer was negative, who expressed his/her comment: "it's been difficult but could easily be made better". The student whose comment was "did not know" explained that he/she "didn't choose this method of learning". This student added that DE via videoconferencing had "taken a while" for him/her to be accustomed to it. The student whose answer was positive commented that: "saves travelling long distances for lecturers". In order to gain a deeper
understanding of the students' preferences for DE or traditional education, the next section reports on this investigation.

**Students' preferences (traditional education or DE)**

This comparative section was added to the questionnaire as a means of acquiring a better understanding of the students' preferences for traditional education or distance education (DE) if they were offered the choice. This, in addition to other factors, can help to determine more detailed factors that affect the students' level of acceptability of DE via videoconferencing. Students were asked to make a choice among the three options, if they were offered the choice, provided that the course would have the same curricula and cover the same course content: (a) learning at a distance, (b) traditionally or (c) the dual mode of delivery (a combination of both traditionally and at a distance).

**Sample A:**

The majority of the respondents (67.86%) choose traditional education while only 14.28% choose DE. The interesting outcome from the respondents was that five students out of 28 (17.86%) reported that they had no preference. The calculations were based on a sample of 28 students since there were three students who did not answer this question. Of these 28, eighteen commented. Of the students whose option was traditional education, fifteen commented the following categories:

(a) Communication: there were four students who based their arguments on the communicational aspects. For example, one of the students highlighted that in traditional settings, students are more likely to learn more due to more efficient communication and therefore interaction. Another student pointed out that he/she got bored when "watching a screen" (see psychological/emotional aspects as well). It would be better with a lecturer in the room, was another comment which is supported by the fact that, in traditional lectures, there is "better interaction" with the lecturer as was pointed out by another student.

(b) Psychological/emotional: eight out of the fifteen comments fall into this category. This is an indication that students' arguments are based on their feelings towards DE via videoconferencing in comparison to the traditional way of learning. For example, one of the students commented that he/she feels more comfortable in a traditional setting. This is supported by other comments that might have contributed to the feeling of being uncomfortable, such as: prefers the personal contact with lecturers and classmates, boredom when attending a videoconferenced lecture, intimidation with the videoconferencing technology, the difficulty in adjusting to the videoconferenced way of learning when students come from a traditional background. Lastly, another comment was that "when you are (the students) given a choice you may be sorely tempted to not attend a videoconference". This last comment under this category reveals that some students fear the unknown which is a common feeling under the circumstance of being exposed to a new and unknown "land" for the first time.

(c) Comparison: there were two comments, from students, that focus on the comparison between DE and the traditional education, in order to support their preference for traditional education. One of the students found that contacting the lecturer in a videoconferenced way was not the same as in a face-to-face setting. Another student wanted to investigate the difference in comprehension if they were attending the same lecture traditionally. This comment could also be under the "academic" category as he/she based his/her arguments for preferring traditional education on the comparison of these two different educational approaches itself.

(d) Pragmatic: there was one student who focused his/her argument for choosing traditional education on the pragmatic aspects of the learning process. He/she preferred traditional education due to the difficulty of the subject matter taught. This comment implies that the idea of DE through videoconferencing is neither suitable nor adequate for more abstract subject matters which also suggests that this might be due to the less effective communication between lecturers and students in DE through videoconferencing.

Comments from the students whose choice was DE fall into the following three categories:

(a) Communication: from a communicational perspective, one of the students whose preference was DE also commented that "it would be useful to meet with the tutor personally on a more regular basis rather than twice a year". This comment implies two striking aspects: firstly, the fact that he/she is unsatisfied with the number of face-to-face meetings and; secondly, that it can fall into the "problem-solving" category since he/she is not only indicating an issue (communicational) but also suggesting its solution.
(b) Pragmatic: one of the students whose choice was DE reported that it was a "new experience". This comment, contrary to the students who fear the unknown, the new, the different, and therefore have a rather conservative attitude, implies the fact that this student has a more self-confident attitude and therefore he/she does not feel uncomfortable learning at a distance through videoconferencing.

(c) Optimistic: one of the students had a very optimistic way of supporting his/her preferences for DE. He/she points out that DE was different from "normal" lectures and that it had "novelty value: keeping you (the students) interested."

To summarize: the psychological/emotional aspect, of deciding between DE and traditional education, plays an important role in this decision-making process. This is because slightly over a half of the comments, from the students, whose choice was traditional education, were based on students' negative feelings towards DE (i.e. uncomfortable, "awkward", boredom, intimidation, difficulty in adjusting, frustration).

Sample B:

Similar to the results of the previous sample (A), most of the students (four out of five) prefer the traditional way of learning if they were offered the option. This is due to the support provided when there is physical/human contact and to the fact that the students are able to acquire a better understanding of the subject currently taught in a traditional setting. One respondent chose the option "both". His/her comment was: "either, it makes no difference to me."

The way students see DE and the videoconferencing classroom

Students were asked to complete two sentences: (1) "Do you see distance education as" and (2) "Do you see the videoconferenced classroom as". Four options to complete each of these sentences were available. For the first one, the options were: (a) "An alternative to traditional education", (b) "A substitute for traditional education", (c) "An attempt to simulate traditional education" and (d) "Others, please specify". For the second sentence, the same structure was kept, but this time regarding videoconferencing classrooms, the options were as follows: (a) "An alternative to the usual classroom", (b) "A substitute for main classrooms", (c) "An attempt to simulate normal classrooms" and (d) "Others, please specify".

Sample A:

More than a half of the respondents (58.62%) saw DE as "an alternative to traditional education". Unfortunately, no one completed the option "others". Nearly half of the respondents (48.28%) saw the videoconferencing classroom as "an alternative to the usual classroom". Thirty-seven percent saw it as "an attempt to simulate the normal classrooms". There were no comments on other ways of seeing it.

Sample B:

Students' views changed slightly from the ones of sample A. Most of the respondents (60%) saw DE as being "an attempt to simulate traditional education". Two out of five respondents saw DE as being "an alternative to traditional education". Regarding the videoconferencing classroom, there were two students who saw it as being "an alternative to the usual classroom". Two other students saw it as being "an attempt to simulate normal classrooms" and only one respondent saw the videoconferencing classroom as being "a substitute for main classrooms".

Meeting students' expectations

A typical factor which determines the students' level of acceptance was to investigate whether or not their expectations (ambitions, desires, and needs) were met. There were two options of answers to the question about whether their expectations were met: "yes" or "no". A blank space was also provided, as it was a simple way of encouraging the respondents to explain their answers.

Sample A:

The analysis of the results indicate that the majority (19 out of 27, 70.37%) had their expectations met against eight respondents (29.63%) whose expectations were not met. The sample was reduced from 31 to 27 due to
two respondents who did not answer this question and two other respondents who did not have any expectations beforehand. Of the students whose expectations were met, ten students reported their comments. They were categorized as follows:

(a) Academic: there were four students whose reasons, for having their expectations met, were from an academic perspective. For example, one of the students pointed out that the videoconferenced course introduced him to a new way of communication. Another student highlighted that the subject itself was difficult, however, the actual videoconferencing was not an issue. There was another student who was learning languages through videoconferencing and in his/her opinion it was "very enjoyable" and thus he/she had "acquired more than basic computer skills". This comment is also an example of an optimistic kind of person, therefore it could also be under the "optimistic" category.

(b) Pragmatic: there were two students whose explanations for having their expectations met fall into a "pragmatic" category. They commented that the lecture was well transmitted and that it served its purpose.

(c) Psychological/emotional: from a psychological/emotional perspective, one of the students argued that it was more likely for students not to interact when they are talking through a TV screen so that there was "less class performance" from lecturers and therefore not all the problems were solved. This comment provides more evidence that the boredom feeling found in previous analyses, can be attributed to the fact that it is not possible for the lecturer to be active (i.e. move from side to side) in relation to the "less performance" aspect. Another aspect of this comment was that there was less communication therefore, the interaction through a TV screen was ineffective. This implies that students are likely to be more passive in videoconferenced classes.

(d) Optimistic: there were three optimistic comments. Firstly, one of the students found that DE via videoconferencing was a "very good experience". Secondly, another student felt that he/she had a good understanding of the course content and the videoconferencing technology was transparent to his/her ability to learn. Thirdly, the last optimistic comment was by a student who expected that DE via videoconferencing would be "good fun, a different way of conducting normally mundane lectures, and it was".

Of the students whose expectations were not met, seven reported their reasons. Their comments fall into the following categories:

(a) Communication: there were two comments that focused on the communicational aspects. For example, one of the students pointed out that he/she feels that it was difficult to be able to communicate with the lecturer. The other comment referred to the fact that the personal contact with the lecturers in traditional settings, was "much better", so that students can "receive notes, ask for help, and hand in assignments". This comment can also be viewed as being part of the "pragmatic" or "comparison" categories.

(b) Psychological/emotional: the only comment under this category was that DE through videoconferencing was "not very personal". Not meeting each other, the distance and the formal atmosphere contribute to the fact that they, the students and the lecturers do "get to know" each other. This can also be under the "communication" category since this is an indication of a communicational issue.

(c) Academic: from the academic point of view, four out of seven students who did not have their expectations met, explained that it was because they found that the course was harder than they thought.

Sample B:

Not different to the results of sample A, the overall outcome was positive. Most of the respondents (three out of four) had their expectations met. Only one student did not have his/her expectation met. Moreover, there was one respondent who did not have any expectations, therefore this question was not applicable to this particular respondent. The respondent whose expectations were not met explained that he/she "had low marks and found it hard to concentrate". However, there were no comments from respondents whose expectations were met.
Students would take a distance learning course via videoconferencing again

Students were asked whether or not they would take another DE course through videoconferencing again. There were two options of answers: "yes" and "no" and a blanked space to encourage the students to explain their answers.

Sample A:

Most of the respondents (21 out of 29, 72.41%) reported that they would take another DE course via videoconferencing again. Only eight students (27.59%) would not take another DE course via videoconferencing again if they were offered the option. The response rate was 93.55%. Eighteen respondents commented (62.07%). Of the 21 students who would take another distance learning course via videoconferencing again, eleven students reported their comments. These comments were analysed in terms of the following categories:

(a) Optimistic: of the eleven students, who expressed their comments on the reasons for taking another distance learning course by videoconferencing, two students had an optimistic explanation. For example, one of the students reported that he/she "enjoyed it very much". This positive attitude could also be classified as being a "psychological/emotional" type of category since it expresses his/her positive feelings. The other optimistic comment was pointed out by a student who thinks that DE via videoconferencing was "a more interesting and modern way of teaching". This comment implies the fact that there are two extreme characteristics: (1) people who have a positive, open and receptive attitude towards new technologies/systems and (2) those who are less receptive, less open and therefore fear the unknown and the new because they might think that DE via videoconferencing is threatening.

(b) Psychological/emotional: there were two students whose views were based on their feelings. For example, one of the students commented that he/she would take another course at a distance through videoconferencing because once he/she gets used to it, then there is no difference between learning traditionally or at a distance by videoconferencing. Furthermore, this comment also supports the idea that the level of acceptability is dependent upon whether students are used to this way of learning. Another comment that was reported reads: "enjoyed it very much" mentioned before since this is also an example of an optimistic attitude. However, his/her positive feeling contributes to his/her acceptance towards DE via videoconferencing.

(c) Pragmatic: there were four comments that fall into this category, from a pragmatic point of view, students' reasons for continuing taking a course at a distance via videoconferencing include: it saves time (reported by two of the four students whose comments fall into this category), it saves money, it is an "attractive option" and lastly, one of the students pointed out that it did not affect his/her "work, in any way, and it is a good alternative to conventional education". This latter comment implies the idea that the course being at a distance and that it was by videoconferencing were irrelevant to his/her ability to learn since his/her work was not affected by this change (from traditional education to DE).

(d) Problem-solving: as it was mentioned previously, the "problem-solving" category is related to the "pragmatic" category. The former focus on the issues and suggestions for its solutions, the latter refers to the practical matters. Hence, whenever the issues mentioned from a "problem-solving" perspective are practical matters, they then become "pragmatic" by definition. Under this category, there were two comments. For example, one of the students would take another course at a distance by videoconferencing because it saves time on travelling between campuses. The other comment emphasizes that it saves not only time but also money. This could, accordingly, be classified as being an "economical" type of category.

(e) Personal aspirations: from the students' own personal aspirations perspective, there was one comment that falls into this category. For example, the student who based his/her reason, for continuing taking a course at a distance by videoconferencing, on his/her own aspirations commented that it may be "useful" if he/she "pursues a career in industry". This comment could also be classified as being the "academic" type of category since he/she took the novelty of the technology to his/her own academic benefit.

(f) Comparison: one of the students mentioned that he/she would take another DE course through videoconferencing because in his/her opinion "it is the same as traditional learning once you (the students) get used to it (...)" This comment suggests that being accustomed is a factor that might determine, in conjunction with others, the high level of acceptability of DE via videoconferencing. Hence, this could be also, a "psychological/emotional" type of category.

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Of the students whose attitudes were rather negative, seven reported their comments. The analysis of their comments indicated that they fall into the following categories:

(a) Comparison: of the seven students who reported their comments for not taking another DE course via videoconferencing again, two students based their arguments on the, sometimes unavoidable, comparative aspects (between DE by videoconferencing and traditional education) of this decision-making process. For example, one of the students pointed out that he/she prefers the traditional way of learning because of the personal contact with lecturers. Another student whose emphasis was on the comparison, argued that he/she "learns more through face-to-face contact". These two comments imply the communicational aspect of the learning process, consequently, these comments could also fall into the "communication" type of category.

(b) Psychological/emotional: from a psychological/emotional perspective, there were three comments. These comments imply three facts: firstly, one of the students highlighted that he/she does "not like talking to a TV screen"; secondly, another student pointed out that it is rather "hard to adjust to it" (referring to the videoconferenced way of learning); and thirdly, another student commented that he/she had "felt very frustrated". This student added that the rest of the class was unable to "participate". This last comment also implies the idea that, to "participate", there should be more interaction between students and lecturers. Consequently, this could also be classified as being a "communication" type of category due to its emphasis, even though indirectly, on the communicational aspect of the learning process.

(c) Communication: there were two comments that fall into this category. For example, one of the students who would not take another DE course through videoconferencing, on the contrary, was willing to do so, under certain conditions: the subject matter and its complexity since "it is hard to communicate". This comment suggests two ideas: firstly, that the level of acceptability of a videoconferenced course is dependent upon the subject matter; secondly, that it is harder to communicate when a course is at a distance and it is by videoconferencing. Another student commented that he/she would not take another distance learning course by videoconferencing due his/her arguments that it is "not very effective, would need twice as long to cover the same amount of the course". This supports the idea that because there is less communication between lecturers and students, then DE via videoconferencing is less effective.

Sample B:

The answers were very well distributed. Three out of five respondents reported that they would take another course at a distance through videoconferencing again but there were two respondents whose answers were "no". One of the students whose answer was "yes" did not express his/her comments. Therefore students who answered positively commented that: (1) "I have got more used to it now" and (2) "I have no objection to videoconferencing learning". Students whose answers were negative explained that: (1) "Didn't suit me, not this semester" and (2) "I prefer normal education techniques". On comparison with the outcomes of sample A, there were no significant differences between the samples, however, students from sample B were slightly less positive towards DE by videoconferencing than the students from sample A.

Students' further comments or issues

Not surprisingly, there were few comments reported by the respondents since this was the very last question on the questionnaire form. The aim of this question was to detect any additional feelings by the students. In other words, to offer the students the opportunity to emphasize any aspects that either were not covered by the questionnaire which they wished to stress or clarify because they felt that those aspects were very important, after completing the questionnaire. All of the comments fall into two categories: "pragmatic" and "problem-solving" since students were offering solutions to practical issues and claiming for more learning support, flexibility, visits by the lecturer, meetings, additional notes and finally more time to formulate questions during videoconferencing sessions.

5.5.5 Comparative analysis between samples A and B

After analysing the responses given by the students of sample B (students who were more experienced with DE via videoconferencing), and making comparisons with responses given by students of sample A (students who were experiencing DE via videoconferencing for the first time), fewer differences were detected than expected. To the contrary, there were several similarities since the differences were not as significant as expected. This section presents an example where few differences were detected:
Firstly, in terms of the level of satisfaction with the videoconferenced way of learning, between the two samples (A and B), the mean values are not significantly different (see table 5.19).

**Table 5.19: Level of satisfaction with the videoconferenced way of learning**

<table>
<thead>
<tr>
<th></th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.68</td>
<td>3.20</td>
</tr>
</tbody>
</table>

This indicates that, to the contrary of what was expected, the more experienced students were less satisfied with DE through videoconferencing than the students who were learning at a distance via videoconferencing for the first time during this survey. However, no classical statistical test, such as an ANOVA or a t-test, was conducted since the data is nonparametric and the number of volunteers in sample B was relatively small, therefore unsuitable for these kinds of tests. If none of the design requirements are violated (i.e., minimum size of the sample) then nonparametric statistical tests could be performed. In this particular case, a chi-square test was performed, but the result was not meaningful because the sample size requirement was violated. The Mann-Whitney u-test (for two groups) was also performed using SPSS (see tables B-1, B-2, B-3 and B-4 in appendix B-III).

Secondly, another aspect, to which the students from both samples (A and B) had a slightly different attitude, was their learning support from lecturers. The more experienced students (sample B) had a rather less positive attitude towards the learning support.

Thirdly, the level of effectiveness of DE through videoconferencing was another aspect in which slight differences were detected. The more experienced students (sample B) had a rather negative attitude towards the level of effectiveness, while the less experienced students expressed a more positive attitude (table 5.18, section 5.5.3). Table 5.20 summarizes these contrasts:

**Table 5.20: Summary of the contrasts regarding the effectiveness of DE via videoconferencing**

<table>
<thead>
<tr>
<th>Aspects of the learning process</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
<th>Mean (A, B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3.47</td>
<td>3.60</td>
<td>3.49</td>
</tr>
<tr>
<td>Students' participation</td>
<td>3.29</td>
<td>2.60</td>
<td>3.22</td>
</tr>
<tr>
<td>Discussion</td>
<td>3.21</td>
<td>2.80</td>
<td>3.15</td>
</tr>
<tr>
<td>Group work</td>
<td>2.87</td>
<td>2.00</td>
<td>2.76</td>
</tr>
<tr>
<td>Consultation with tutor: one-to-one</td>
<td>2.71</td>
<td>2.00</td>
<td>2.62</td>
</tr>
</tbody>
</table>

To conclude, the more experienced students had, in general, a less positive attitude towards DE via videoconferencing and sometimes had a rather negative attitude in comparison with the less experienced students. Nonetheless, this assumption might have been affected for three main reasons. Firstly, the relatively small, but still reasonably significant, number of volunteers in sample B. Secondly, the fact that the students in sample B volunteered themselves again since they had already volunteered themselves for the first North Irish survey (sample A), this may be because they were the ones facing more problems and therefore less happy and less satisfied with DE via videoconferencing. Thirdly, the fact that the difference in experience with DE was not as great as it could be (one year or so) so that more differences would possibly have been detected.

### 5.6 Summary and discussion of results

In the introduction of this chapter, two major objectives were stated:

1. To gain awareness of the use of videoconferencing as a different means of DE, and
2. To learn more about how lecturers and students feel when they are teaching and learning at a distance via videoconferencing.

The analysis of the responses from both lecturers and students reveals some findings about the problems they face when they teach and learn at a distance via videoconferencing. This section reports on the major issues and why they occur. Three major issues that affect the lecturers were detected by the methodology. These issues refer to:
the usability (i.e. equipment and contact with students), the organizational (manual with instructions, time for planning, management by the University) and the communicational types of human factors issues.

As a result, this DE delivery is appropriate for the University to save money on lecturers travel claims and reach a wider audience. However, lecturers on the one hand would like the following: firstly, from an organizational perspective, to have more time to plan videoconferenced lectures so that they can send out printed material in advance; secondly, from a technical perspective, to have a manual on how to operate the system on the desk and to have the system updated (i.e. labelling of buttons, camera and microphone switchable, and larger screens) and; thirdly, from a communicational perspective, to use e-mail as an effective means of providing support to students.

On the other hand, students faced rather more problems. The analysis of the responses given by the students indicated that they were facing problems with:

(i) The method of contact with lecturers - firstly, from a communicational perspective, contacting the lecturers by e-mail and videoconferencing was rather problematic. They complained that e-mail was impersonal, it took time to receive a reply and they were unable to check up regularly. The problems they faced with videoconferencing were that they: found it hard to communicate, they are interrupted due to the automatic switch off at the end of class, there was lack of communication outside the class, they had to speak louder than usual, the lecturer could not assist their work individually in class, feedback was difficult; secondly, from a technical perspective, the equipment did not always work properly; thirdly, from an organizational perspective, the system (videoconferencing lecture room) could be unavailable when it was previously booked by another lecturer.

(ii) Level of satisfaction of DE via videoconferencing for student consultation with lecturer - the level of effectiveness of DE via videoconferencing was measured for each aspect of the student's learning process (table 5.18, section 5.5.3) which indicated that the students did not think that DE via videoconferencing was efficient for consultation with lecturers. The mean value (2.71) was lower than the value "3.00" which is neutral. This is not surprising, since they were facing problems contacting their lecturers by videoconferencing, specifically with communicational and technical types of problems.

(iii) Their preferences - most of the students (67.86%) would have preferred to learn traditionally if they were offered the choice. This is explained by the fact that they prefer the personal contact of traditional lectures, feel more comfortable with them and think that it is easier to learn and understand, since there is better communication due to immediate interaction, specially between students and lecturers. One interesting finding was that one of the students commented that he/she gets bored easily when attending a videoconferencing lecture since “watching a screen” can be monotonous. This was confirmed by the observation session. The other reason was that traditional education is less intimidating and it is rather difficult to adjust to a different way of learning.

(iv) Their feelings - it is, therefore, evident that the main factors affecting the students and thereby responsible for their negative attitude towards DE by videoconferencing, are especially dissatisfaction and frustration, including:

- Firstly, the fact that students were not aware that they were enrolling in a course at a distance through videoconferencing.
- Secondly, there is a clear demand for an induction session to introduce them to this different way of learning, to the videoconferencing technology, to the lecturer and to the technician. This should be by a face-to-face meeting at the start of the course. This is supported by the fact that any (technology, i.e. system or programme) cause changes as a natural affect of its implementation. For example, one of the students commented that the videoconferencing equipment was intimidating, they feared the equipment. They feel rather less comfortable than in a traditional setting and that it takes time to get used to the videoconferenced way of learning.

(v) Communication - most of the students expressed a wish to have more face-to-face contact with their lecturers. They would rather have, at least, one introductory session by traditional means at the videoconferencing lecture room so that they would get to know the lecturers, the classmates, and were introduced to the videoconferenced way of learning (mentioned previously as one of the factors that contributes to the students' negative attitudes).

(vi) Technical improvements - from this perspective, one of the students would prefer to have a larger screen.
After having concluded the data analysis and the data reduction, it was possible: (1) to identify whether the human factors issues were of the same kind as found in the previous case study (chapter 4); and (2) to draw conclusions about a further understanding of these issues on how they affect the stakeholders and why they happen. A conceptual framework is presented as an attempt to model the dynamics between the causes of these issues and its effects on stakeholders (figure 5.16) and explain the overall results.
EDUCATIONAL INSTITUTION
- Technical support
- Management
- Time available
- Organization

TEACHING PROCESS
Specific tasks:
- Send handouts to other campuses in advance (e-mail or post)
- Arrange rotation at all campuses
- Operate videoconferencing facilities
- Collect assignments from all sites
- Provide support to students

EDUCATIONAL TECHNOLOGY
Videoconferencing and E-mail
- Functionality
- Usability
- Reliability

LEARNING PROCESS
Specific tasks:
- Read handouts previously to videoconferencing classes
- Attend videoconferencing classes
- Send assignments to lecturer
- Ask for further support from lecturer by e-mail

LECTURERS
SUCCESSFUL:
1. Satisfaction
2. Motivation
3. Teach by videoconferencing again

UNSUCCESSFUL:
1. Dissatisfaction
2. Frustration
3. Discontinue teaching by videoconferencing

STUDENTS
SUCCESSFUL:
1. Satisfaction
2. Motivation
3. Take other DE courses by videoconferencing

UNSUCCESSFUL:
1. Dissatisfaction
2. Frustration
3. Dropout

Figure 5.16: Conceptual framework of DE via videoconferencing delivery
5.7 Conclusion and recommendations

This section focuses on the conclusion based on the aims stated at the beginning of this chapter. The first section discusses the answer to the research question: "Is DE by videoconferencing effective?" The second section discusses the variables experience and satisfaction. The third section presents general recommendations for an effective DE by videoconferencing programme. The fourth section discusses the methodology adopted in this case study and the last section discusses the limitations of this study and indicates the research gap to be bridged by the fieldwork carried out and reported in the next chapter (case study C - evaluation of DE through multiple technologies).

5.7.1 Effectiveness

The effectiveness of DE via videoconferencing was rated by both lecturers and students for five aspects of the teaching and learning processes (see lectures' ratings, section 5.4.3 and students' ratings, sections 5.5.3). Table 5.21 below summarizes the contrasts between lecturers and students' ratings of the level of effectiveness of DE via videoconferencing.

Table 5.21: A comparison between the effectiveness of videoconferencing by lecturers and students

<table>
<thead>
<tr>
<th>Aspects of the learning process</th>
<th>Lecturers Mean</th>
<th>Students Mean (A,B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3.62</td>
<td>3.49</td>
</tr>
<tr>
<td>Students' participation</td>
<td>3.00</td>
<td>3.22</td>
</tr>
<tr>
<td>Discussion</td>
<td>3.00</td>
<td>3.15</td>
</tr>
<tr>
<td>Group work</td>
<td>3.16</td>
<td>2.76</td>
</tr>
<tr>
<td>Consultation</td>
<td>3.20</td>
<td>2.62</td>
</tr>
</tbody>
</table>

According to the students, DE by videoconferencing is somewhat ineffective for group work and consultation with tutor. Lecturers, on the other hand, had a slightly more positive attitude towards the effectiveness of DE. However, they were neutral regarding the effectiveness of DE by videoconferencing for discussions and for students' participation. Therefore, these results demonstrate that DE via videoconferencing was effective overall for the lecturers, but not for the students who were rather neutral. However, the issue of effectiveness is not only dependent on their absolute ratings but also on other variables that are taken into consideration as a means of triangulation (chapter 3, about the methods adopted in this work).

The effectiveness of a DE programme can be measured in terms of the technology capabilities and in terms of the lecturers' ability to conduct the DE course in a manner that fits the characteristics of the medium, the nature of the course materials and the characteristics of the students (Hiltz, 1994; p.7). This has implications on whether lecturers and students can exploit the videoconferencing's potential to support an active teaching and learning process (Mason, 1999; p.45) that incorporates interaction among students as well as between lecturers and students, and whether lecturers and students receive enough technical support.

Therefore, the triangulation technique, supports the analysis of the level of effectiveness of DE via videoconferencing from both, lecturers and students perspectives, and takes into account the following variables:

(a) The videoconferencing system capabilities and reliability

A number of technical issues were detected from both the perspectives of lecturers and students. They contribute to the ineffectiveness and unreliability of the videoconferencing system. Time lags during communication via videoconferencing and breakdowns contribute to the students' frustrations when the lecturer is interrupted by the automatic switch off resulting in an incomplete lecture (i.e. not all the content is covered). The effectiveness of communication between lecturers and students is affected by the medium choice (i.e. e-mail, telephone or videoconferencing). For each medium, a number of issues were detected (see section 5.4.2 for the lecturers and table 5.14, section 5.5.2 for the students).
(b) Appropriateness

The appropriate relationship among the videoconferencing system, the nature of the course materials and the characteristics of the students was also affected by the attitudes of some students (i.e. the ones who were less receptive to new technologies). The nature of the course material is related to the nature of the subject matter and the characteristics of the lecturer (his/her teaching style). For example, the lecturer who was teaching linguistics complained that videoconferencing was not an appropriate mode of delivery to his/her subject matter neither to his/her teaching style due to the limitations of this technology for role-playing.

(c) Technical support

Despite lecturers being satisfied with the technical support provided, they still face problems when they teach after 5.00 PM when there is no technician available and the lack of a technical instruction manual. Students, on the other hand were less affected, although, the group of remote students do have to sort out some technical difficulties by themselves.

5.7.2 Experience and satisfaction

This section addresses the question: "Is there any relationship between the students' level of experience with DE by videoconferencing and their level of satisfaction?" The statistical test performed and described in section 5.5.5 indicates that there is no significant difference between the students' level of experience with DE via videoconferencing and their level of satisfaction with the videoconferencing way of learning. However, because of the small size sample, the power of the statistical test performed (Mann-Whitney) was diminished. Even so, the trend in this result confirms the results found by Mason (1989, p.120) that previous experience does not determine satisfaction although it may be an advantage.

5.7.3 General recommendations

The recommendations, for a successful DE by videoconferencing programme, that arise from this evaluation were not entirely different from the previous evaluations carried out by others researchers in the field:

- A good induction session (face-to-face) at the start of the course (Abbott, Dallat & Robinson, 1995; p.80);
- Print-based material sent out to students in advance (Abbott, Dallat & Robinson, 1995; p.80);
- Initial and intermittent face-to-face meetings (Abbott, Dallat & Robinson, 1995; p.80; Holmberg, 1983, Holmberg, 1988; Tong, 1998; Bååth, 1980; Daniel & Marquis, 1979; Rekkedal, 1985 and Sewart, 1978);
- The process of updating systems and technologies whenever possible;
- Provision of support to students on a regular basis (i.e. answering e-mail);
- Ensure students' access to appropriate technology and resources (i.e. computers with Internet, library);
- Meeting students' expectations (Tong, 1998);
- Better planning, management and support by the faculty.

5.7.4 Methodology adopted

In the previous survey (case study A, chapter 4), the methodology used included three instruments: (a) checklist, (b) postal questionnaires, and (c) semi-structured interviews. For this case study, there was no need for a checklist since this was proven to be more helpful in the first case study (A). In this case, the questionnaires, in particular, had undergone a number of amendments to suit the videoconferenced way of teaching and learning, and due to the conversion of some of the open-ended questions into closed as a result of the lessons learned to date. In this case study, permission was obtained to observe one of the videoconferenced classes. This instrument was therefore added to this case study. Another method was added so that a general understanding of the DE programme and the context of use of the videoconferencing technology could be acquired. Therefore, conclusions about the use of the methodology fall under four headings:
According to the section 3.4.1 (see chapter 3), whenever reports and articles were available, it was possible to establish the first contact with the person in charge of the DE programme in a particular institution or the author of the report or article. This gave the evaluator or researcher an opportunity to learn more about the DE programme in this institution and therefore to find out whether this was a feasible context to conduct the evaluation. Moreover, this provided the evaluator or researcher with the ability to write a contract in which the general intentions of the evaluation in a clear and non-threatening way could be outlined. In section 5.3.3 of this chapter "Procedures", it was reported that this University was approached through a senior lecturer at the School of Social and Community Sciences since one of his/her articles was found on the Web. Therefore, the analysis of this first document provided important clues about the context in which DE through videoconferencing was being used at this University. This has proved to be surprisingly helpful due to the general awareness gained prior to conducting this case study.

Interviews

The first group of lecturers interviewed had proved to be extremely helpful, especially in gaining a better and more specific awareness not only of the context in which they were teaching at a distance but specific details about their DE programme and the technology they adopted (i.e. the type of videoconferencing system). Since this first group of lecturers was interviewed, the questionnaire had undergone slight adjustments so that it could suit the lecturer's context of teaching, and the specific questions about the videoconferencing technology could be added. Furthermore, the interview with the technician was even more helpful: firstly due to the better understanding that was acquired about the functionality of the videoconferencing technology. The interview session took place in one of the videoconferencing lecture rooms so that some details about its functionality, how it works and how it is used by the lecturers could be demonstrated; secondly, the technician provided a list of names and telephone numbers of lecturers who had already taught through videoconferencing or were currently teaching at the time of this survey. This was highly efficient because time schedule for this case study was quite tight. During the interviews with each lecturer, it was asked whether they were currently teaching via videoconferencing. If they were, permission to survey some of their students could be negotiated. Of the nine lecturers interviewed, only two were currently teaching via videoconferencing at the time of this survey. They both agreed to have their respective students surveyed. One of them provided permission to observe his/her class and videotape it as well.

Questionnaire administration

Since the case study at the local College was completed with the first group of lecturers and students, the questionnaire forms have undergone adjustments. These adjustments were due to three aspects: Firstly, before the visit to the University, the analysis of the article available on the Web, proved to be extremely helpful, even though, little information about the kind of videoconferencing system in use, was provided, so few alterations were necessary to suit the section regarding the general impressions about using videoconferencing. Secondly, this section of the questionnaire used a multiple-choice rating scale originally developed by Shneiderman to obtain the lecturers and students' impressions of the use of videoconferencing. It was originally designed for desktop videoconferencing systems and not the type used in this University so that some of his original questions are not applicable to this case study (B). Thirdly, the section (5.4.2 and 5.5.2) about the general problems of teaching at a distance through videoconferencing was included for the context in which lecturers and students were teaching and learning by videoconferencing.

Classroom observation

Students could not be interviewed on an individual basis as the lecturers were; instead, a group of students from sample A was observed during one of their videoconferenced classes. In the remaining group of students of this same sample (A) the lecturer distributed questionnaires for completion during the students' coffee break. This latter procedure was also used with the students of sample (B). The videoconferencing classroom observation technique was used as a supplement to the data gathered by the questionnaire administration with the students (triangulation). The outcomes from the observation have proved to confirm some of the students' comments. For example, one of the students mentioned that he/she gets "bored easily, watching a TV screen". This view was supported and confirmed by analysing the video recordings of the videoconferencing lecture room observation. In that, most of the students appeared to be rather bored. This was not due to the lecture itself but to the formal atmosphere and the intimidation of the videoconferencing equipment, i.e. cameras. The next section outlines the limitations of this case study and indicates the gap that will be addressed in the next chapter.
5.7.5 Limitations of case study B

The methodology, as a whole, has proved to be effective in gaining awareness of the DE programme by videoconferencing at this University in Northern Ireland and gaining a better understanding of this programme, its issues, how and why they occur. However, the hardest aspect was probably, to obtain formal permission to conduct this survey. The process was made even harder when students surveys were required. Another difficulty was to gain access to account records on the number of students who were taking videoconferencing classes at a distance or who had already been taught by videoconferencing, and the number of lecturers who were teaching at a distance by videoconferencing or who had already experienced this at the time of this survey. Several attempts by interviewing relevant people, (i.e. the technician who is responsible for booking every videoconferencing session at one of the campus), were made to have a sense of scale and therefore, to ensure the statistical reliability of the samples. However, it appeared that there were no records of these numbers so they had to be estimated. This might be another indication of lack of organization and proper management of the system by this University.

Although individual interviews and personal meetings with volunteers to administer questionnaires were time-consuming, the latter seemed to provide better control to the evaluator so that she could make sure that all the open-ended questions were completed properly. This is because of the relatively long length of the questionnaire and the number of open-ended questions. As a result, the number of open-ended responses, which provide a great amount of relevant and important information, was reduced. On the other hand, the analysis of these open-ended responses was a surprisingly time-consuming task. As a lesson learned, this added time factor is a critical aspect that the evaluator should be aware of in advance. Moreover, another aspect that this case lacked was that most of the lecturers were using the same kind of videoconferencing system so that the questionnaire had to focus on this particular type of DE (see taxonomy of DE, chapter 1). Nevertheless, an excellent awareness of this kind of videoconferencing was gained. In order to get a more general picture of DE, the next chapter will discuss the evaluation of DE through multiple technologies. This will provide an appropriate opportunity to gain awareness of several kinds of technology for DE where lecturers and students experience DE through multiple technologies.
Chapter 6

The Evaluation of Distance Education via Multiple Technologies - Case Study C

6.1 Chapter outline

The previous chapters of this part of the thesis presented the fieldwork on the evaluation of on-line training at a distance and the evaluation of DE via videoconferencing. To complete the investigation of the computer-based DE mode of delivery, this chapter describes the fieldwork carried out on the evaluation of DE through multiple technologies delivered through the Internet. To investigate the use of multiple technologies as a means of delivering DE as well as to evaluate its effectiveness, surveys were carried out with the stakeholders (lecturers, students, a technician, a DE programme director and a dean). The survey instruments adopted were the same as the ones adopted in the previous case study (chapter 5) with the exception of classroom observations and videotaping which were not applicable to this case study. This chapter is divided into the following sections: section two describes the context in which DE through multiple technologies is used at this university. Section three describes the methodology adopted for this case study. Section four presents the analysis of the lecturers' responses to DE through multiple technologies. Section five presents the analysis of the students' responses. Section six summarizes the results and section seven presents a discussion which offers a conceptual framework that models the cause and effect dynamics of the issues in this kind of DE. Figure 6.1.a illustrates chapter 6 in relation to the overall thesis structure.

A university in North America provided the appropriate setting for this investigation and evaluation. This is another Multi-campus University located in the mid-western part of the US. This North American university has, for decades, delivered off-campus instruction through various media, from postal correspondence courses to videotape, television, one and two-way video, and satellite. However, this case study focuses only on the computer-based DE programmes via the Internet as shown in figure 6.1.b.
6.2 The university context and the Internet

This North American University has three campuses located 150 miles apart. They are located in the midwestern part of the US. This multi-campus characteristic, similar to the previous case study (chapter 5), has led the faculty to adopt the use of various technologies associated not only with a synchronous mode of delivery (including RealAudio and on-line chat), but also with Asynchronous Learning Networks (ALN) to link the three campuses. These ALN technologies include network-based access both to learning materials (e.g. multimedia tutorials, and information on the Word Wide Web) and to people via (asynchronous conferencing systems, such as FirstClass and WebBoard).

The University provides an induction section with a sample of a DE course specially designed for the beginner student who might not be familiar with the skills required and this is available to the student before he or she enrolls as an on-line student. Furthermore, the University also has a programme responsible for providing support not only to students but also to faculty members on content and course deliveries. The aim of this programme is to ensure educational opportunities for lifelong learners wherever they live. Some of these long learners are professionals throughout the mid-west and elsewhere. For them, this programme offers postgraduate-level, off-campus degree and certificate programmes and credit courses. However, for undergraduate students, correspondence and non-credit courses are offered. The off-campus courses are delivered via several instructional formats including face-to-face, print, audio and videoconferencing, and on-line instruction. For local learners, a community programme is offered that gives access to on-campus credit courses, non-credit courses, and test preparation courses. In addition, this programme's directors work with external constituents (corporations, governmental agencies, professional associations, etc.) to help them to identify their continuing education needs, and to develop programmes that address those needs.

The University has a third on-line programme that offers a central source of information about the on-line courses, DE programmes, and public service activities offered by the three campuses of the University. All of the courses and programmes listed in its catalogue are conducted mostly or completely over the Internet. This on-line programme offers distance interactive courses: short courses, regular courses, certificate programmes and degree programmes that support computer-based enhancement of traditional on-campus instruction (Manning & Oakley, 1997; p.1). This programme is a University-wide initiative providing leadership, co-ordination, and financial support in the areas of Internet-based education and public services. The primary goal of this initiative is to offer new on-line learning opportunities, especially complete degree and certificate programmes, to place-bound and time-restricted citizens in the mid-west. The programme has supported the development of about thirty new on-line programmes (including one professional degree, ten complete Master's degrees, a baccalaureate completion programme, and more than ten certificate programmes). This programme is administered through the office of the Vice President for Academic Affairs. A committee, with representatives from all three campuses, serves as the core-planning group for
this DE programme and services. In addition, a small administrative staff attends to inter-campus co-ordination, public relations and outreach, programme development, support, research and evaluation. This programme does not actually develop and deliver on-line courses, but rather facilitates these activities by:

- Publishing an on-line catalogue of all the University's programmes conducted over the Internet;
- Promoting the benefits and potential of Internet-based instruction to faculty and administrators on the three campuses;
- Providing mechanisms to identify markets for Internet-based education and public service;
- Offering grants to units developing Internet-based programmes;
- Supporting research on the effectiveness of on-line education;
- Assisting in the evaluation of the University's on-line programmes and initiatives;
- Ensuring University-level attention to issues of special concern to faculty, such as ownership of courseware, workload, and recognition;
- Offering consulting and training to faculty who are developing and teaching on-line courses;
- Working with the three campuses to develop appropriate support services for off-campus students.

The next section describes the methodology adopted in this case study, the aims, the instruments and procedures to achieve these aims and the samples of the surveys conducted in this case study.

6.3 Methodology adopted

6.3.1 Aims of case study C

a) In this case study the general aims are:

- To identify, the issues that affect the effectiveness of the DE programme in this University; and
- To investigate the factors that affect the lecturers' teaching process and the students' learning process.

b) The specific aims are:

- To investigate how each technology fits into the teaching and learning processes;
- To investigate the extent to which DE through multiple technologies is effective;
- To investigate whether there is a relationship between the course content, the subject matter taught; the students' learning styles, behaviour, needs and gender and the effectiveness of DE via the Internet; and
- To build a preliminary conceptual framework capable of modelling the causes and effects of the technology on the learning and teaching processes.

6.3.2 Sources of data

The instruments adopted in the surveys with the stakeholders included: document analysis, semi-structured interviews and postal questionnaires. The document analysis involved the study of the available documentation, articles and procedures of the DE delivery in this University. The questionnaires underwent a few minor alterations from the questionnaire used in the previous case study to suit the multiple technologies used by the DE programmes of this University. These alterations involved removing all the specific questions that were only concerned with the use of videoconferencing. In addition, other means of communication between lecturers and students were included to the range of options of both questionnaire forms (appendix C-I: lecturers’ questionnaire and appendix C-II: students’ questionnaire). These were the WebBoard, Chat on the Web, RealAudio, and the Webcast.

6.3.3 Procedures

Firstly, e-mail contact was established with the Professor of Geography whose DE summer course was to be delivered by several educational technologies. Secondly, this lecturer suggested contacting another lecturer whose responsibility was to set up the course at a distance since he was in charge of the instructional technology for DE. A proposal with a brief description of the aims and intentions of this survey and a formal request for permission to
survey lecturers and students, who would be taking a distance course or had taken DE courses before, was sent to this professor.

As a result of meeting these lecturers, other lecturers were also suggested. The first meetings provided an opportunity to find out whether they would be suitable and whether they would be willing to complete a questionnaire. This was done by having a very informal and short conversation in which a brief description of this survey's aims and intentions were presented. Chapter 3 "Research methods" describes, in more detail, the methodology and the procedures for interviews. After meeting with more than 30 lecturers, it was found that about three-quarters had actually taught distance courses before and one was teaching during the summer. They were, therefore, suitable for the survey and willing to be interviewed and to complete the questionnaire.

To investigate whether there was a relationship between subject matter and gender; hence students' learning styles, behaviours, and needs; and the effectiveness of DE via the Internet, the sample of students was divided into two samples according to their departments. Before sending the questionnaires to the first group of students, meetings with the Dean of one of these departments were arranged and information about the way the DE course is delivered, the technology they use and the students' profile was gathered. Consequently, the students' questionnaire has undergone a few alterations in order to be suitable. None of these alterations were dramatic, thus the essence of the previous questionnaires, designed to the previous case studies, was kept to allow for a consistent and systematic cross-case studies comparisons (chapter 7). The same adjustments were made for the second group of students due to information gathered from the DE programme director of the other department, whose permission was also gained. However, there were no significant differences between both questionnaires for each group of students but the reason for analysing the data from both samples separately was to detect whether there were differences in the way these two groups of students reacted to DE via the Internet.

6.3.4 Sample

Twenty-three lecturers were interviewed and completed questionnaires. Access to students was far more difficult. Several difficulties were encountered which made the process of seeking students' access harder. Even so, permission was gained to survey several students from different departments. Two groups of students from two different departments were surveyed. Twenty-five questionnaires were sent out to the first group of students (Library and Information Sciences) and 60 questionnaires were sent out to survey the other group of students (Mathematical Sciences). Of the 85 questionnaires sent out, there was a return rate of over 40%. Thus, the sample of students consisted of 36 students in total. Sample A consisted of 17 students from Library and Information Sciences, while sample B consisted of 19 students from Mathematical Sciences.

6.4 Lecturers' responses to teaching through the Internet

During this survey, more than 30 lecturers were visited. Of these 30 lecturers, 23 were interviewed and completed the questionnaire. Others were DE programme co-ordinators and researchers in this field but had never taught at a distance before. Despite the fact that it was not appropriate for them to complete the questionnaire, their interviews were also useful. They either provided names of other lecturers with whom contact was established or provided articles reporting their research into this field. Initially, the lecturers' questionnaire had a number of open-ended questions due to the difficulty in designing predictable options and categories when lecturers were using multiple instructional technologies.

6.4.1 Lecturers' background

Nearly half of the lecturers surveyed were in their forties (47.8%). Slightly more than a half were male (56.5%). All of them were teaching at one of the three campuses with the exception of only one who was based at another campus. They were from different subject areas: Education, Library and Information Sciences, Geography, Mathematics, Animal Sciences, National Centre for Supercomputing Application, and Communication. Being from different areas provided a rich source of different opinions, attitudes, and reactions to DE. The highest concentrations were in the School of Education (39.1%) and Library and Information Sciences (26%). Their level of experience with DE also varied. However, most of the lecturers surveyed had taught at a distance for less than two years (table 6.1).
Table 6.1: Experience with DE

<table>
<thead>
<tr>
<th>Number of lecturers</th>
<th>Years of experience with DE</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>had taught for less than two years</td>
<td>57.2%</td>
</tr>
<tr>
<td>5</td>
<td>had taught for between two and five years</td>
<td>21.7%</td>
</tr>
<tr>
<td>3</td>
<td>had taught for between five to ten years</td>
<td>13%</td>
</tr>
<tr>
<td>2</td>
<td>had taught for less than two years</td>
<td>8.7%</td>
</tr>
<tr>
<td>1</td>
<td>had taught for more than ten years</td>
<td>4.35%</td>
</tr>
</tbody>
</table>

Lecturers' expectations

This open-ended question: "What were your expectations about teaching at a distance via the Internet?" proved to be a valuable source of information. The rate of response was 100%. Lecturers' expectations were diverse. Thus, the following categorization is presented, the numbers between brackets represent the quantities of comments in each category:

(a) Pragmatic (1): of the 23 comments, only one solely emphasized pragmatic aspects of the lecturers' expectations. He or she argued that the technology did not interfere with his or her teaching course content.

(b) Pragmatic and economic (4): one lecturer felt that DE via the Internet enables higher rates of enrollments and therefore more students to attend his/her classes. Another comment was that DE via the Internet would expand the range of audiences and the last two comments support the idea that it allows for expanding the class to people who could not meet face-to-face.

(c) Pragmatic and academic (1): one lecturer pointed out that it allows for developing "classroom relationships with students at a distance" and "learning about the technology and teaching it first hand" provide him/her with the feeling of being a "pioneer".

(d) Comparison (3): from this perspective, lecturers expect the course at a distance to be "comparable in scope and quality" to the on-campus course, to get equivalent evaluations between on-line and on-campus courses and make students at a distance feel like students in the regular classroom.

(e) Academic (5): one of the lecturers was interested in "exploring the extent to which technology could assist in reaching a dispersed group of students". Other lecturers expected to learn "what the technology is capable of", "how a variety of technologies worked for distance education", to further his/her own technological confidence and familiarity. The last comment was that one of the lecturers expected to design and teach the first on-line Masters' programme in her/his department.

(f) Optimistic (2): one of the lecturers commented that DE via the Internet provided "exciting new possibilities" and the other comment was that it provided "a good opportunity to try out something new and this would challenge old models of instructions".

(g) Student centred (3): these comments are overlapping with the "problem-solving" category and the "pessimist" and "Pragmatic and problem-solving" categories respectively:

(h) Student centred and problem-solving (1): for example, one of the lecturers expected to "help the students as much as possible" and after the DE course was finished he/she realised that it would have been much easier if she/he "had a mentor who was easy to contact". This supports the idea that support plays a key role in DE. The reason for this being also under the "problem-solving" category is the fact that he/she not only addresses this problem but suggests its solution.

(i) Student centred and pessimistic (1): one lecturer expressed a rather negative attitude towards her expectations. He/She thought that DE via the Internet would be "alienating (referring to the students) and time-consuming (referring to himself/herself, the lecturer)".

(j) Student centred, problem-solving and pragmatic (1): these three categories overlap due to the fact that this lecturer's comment does not only focus on the students, but it has a problem-solving feature when he/she addresses
the so-called pragmatic problem of distance. He/she felt that DE via the Internet allows the enrolment of Masters' students who could not travel to campus and therefore must take a course at a distance.

(k) Realistic (1): one of the lecturers had neither a negative nor a positive attitude towards his/her expectations. He/she had a rather realistic one assuming that "it would require more time and effort to gain needed technical skills, 'reinvent' curriculum for on-line teaching and learning, keep in touch individually with distance students throughout course". He/she hoped that "it would add flexibility to teaching and learning".

Reasons for teaching at a distance

Over two-thirds (69.6%) of the respondents reported on their reasons for teaching at a distance. Nevertheless, the answers given proved highly meaningful. Their comments were analysed and categorized into the following:

(a) Requirements by the department (7): of the 17 comments, there were seven comments by the lecturers whose reason for teaching at a distance via the Internet was due to the requirements of their department.

(b) Pragmatic, problem-solving and economic (5): this category refers to the motives when these are related to the so-called pragmatic problem of distance, and solutions suggested (problem-solving) by using DE via the Internet to reach a wider audience (economical aspect due to higher enrolments).

(c) Academic (2): for example, one of the lecturers' reasons for teaching at a distance via the Internet was that he/she wanted to teach about the technology. Another example is the comment by another lecturer whose reason for teaching at a distance was to keep up with the latest trends and technologies in teaching.

(d) Optimistic (3): the reason for teaching at a distance via the Internet was that it was the "wave of the future", "a brilliant idea" and "the best way to do it".

6.4.2 Usage of the Internet technologies for DE

The context of use of the Internet technologies provides a framework for determining its usability. The next sections present the context of use of the Internet technologies for DE by the lecturers.

Lecturers' task

Lecturers are responsible for performing the following tasks:

- To explore the limitations and the capabilities of the various technologies currently available so that the appropriate technology can be chosen to meet the lecturers' teaching styles, their subject matter and still be appropriate to the needs of the students (role of the institution);
- Once the institution has chosen the appropriate technologies, lecturers must learn how to master them efficiently;
- To explore the technology's usage to deliver classes and convey information in its most effective way;
- To plan classes to be delivered at a distance;
- To prepare on-line classes;
- To plan synchronous discussions;
- To arrange, organize and schedule synchronous sessions;
- To prepare assignments to post on the Web;
- To provide feedback to students via e-mail, chat, and WebBoard;
- To meet students face-to-face at least once a semester;
- To mark students' assignments.

Although these are the general tasks identified by the survey, lecturers' tasks vary according to their department, subject matter and teaching style. For example, in the department of geography, there was a lecturer who had all his course set up by another lecturer. In the department of mathematical sciences, there are TAs (Teaching Assistants) who provide most of the technical support and communication with students. There are many North
American universities that employ TAs who act as facilitators and mentors to the remote student. They can mentor remote students because they have become experienced in this process so that they can also facilitate it by providing advice. Some of these TAs assume a great deal of responsibility. They provide all the necessary support to students, help the lecturers with grading students’ assignments, and make sure every student is receiving responsive feedback via e-mail and telephone.

Lecturers’ role when teaching at a distance via the Internet

In comparison with the role that the lecturer assumes in the previous kind of DE (chapter 5), lecturers in this case assume rather different roles as they lose part of their control over the students’ learning process, who consequently gain more responsibility over their own learning process and thus become more independent in it (see figure 1.8, section 1.5.1 of chapter 1). To investigate the new role of the lecturers in this case study, lecturers were asked to comment on whether their roles for teaching at a distance have changed with the introduction of new instructional technologies and the challenge of teaching at a distance to a wider audience. Due to the open nature of this question, the original format of this question remained open-ended so that the respondent would have more freedom to answer. After analyzing these comments, it was possible to summarize them into the following categories:

(a) The lecturers’ general role (17):
- Facilitator (6)
- More work, time consuming (3)
- Guide (2)
- Supervisor (1)
- Less directive (1)
- Manager of students’ learning (1)
- More encouragement of students’ participation (1)
- Provide more feedback to students (1)
- More organized (1)

(b) Specific roles (3):
- More time spent on handling the technological aspects (1)
- Became better designer of instructional material (2)

(c) No change, the role remains unaffected (3)

The values between brackets represent the frequency with which each of these categories was mentioned by the lecturers. These values indicated that lecturers mentioned their general roles (17) more than their specific roles (3) which were related to their specific tasks as a distant lecturer. Three out of 20 lecturers pointed out that their roles have not changed since their teaching styles were unaffected by the distant teaching process and its technologies. One of these lecturers argued that he or she "would have liked it to change, but in fact it did not". He or she added that a mentoring role was expected, however, it had not happened.

Main methods of contact with students

Six options were available for this closed-ended question: (a) "WebBoard", (b) "e-mail", (c) "Chat on the Web", (d) "RealAudio", (e) "telephone" and (f) "others". The lecturers were asked to provide the main methods of contact with students from this range of six options. The most used methods were e-mail and WebBoard. They were used by 20 out of 23 lecturers (86.95%) and 19 out of 23 (82.61%) respectively. A brief summary describes each of these methods of contact. See tabulation of the results in terms of usage percentage — numbers between brackets - on table 6.2.

- WebBoard- WebBoard is a Web-based discussion or conferencing tool for posting reading and homework assignments onto the Internet. It provides a framework for threaded discussion and frees both students and lecturers from constraints of different time zones and locations.
RealAudio - RealAudio is a tool that provides real-time, streaming audio protocol over the Internet. It has the ability to transfer instantaneous sound because it compresses and encodes a standard audio file, e.g. WAV, and sends it as a stream of information over the Internet. This is accomplished by the use of a specialised server program on the source end and by decoder/player software on the receiving end, which works in conjunction with several Net browsers. As a result, RealAudio has the ability to send audio over the Internet that is relatively fast and of quality depending on the source material.

Webcast - Webcasting tool allows for broadcasting 'live' events over the Internet. This can be done using either RealVideo or Windows Streaming Media. It uses streaming technologies that allow users to experience audio and video on the Web without the need to download a file. It can be targeted to either the world-wide general public or to highly controlled audiences through passwords. The quality of a 'live' Webcast is dependent upon the degree of the Internet connectivity (bandwidth) available at the venue from which the event takes place.

RealVideo - RealVideo is a tool that sends video-compressed over the Internet that can be played in real time. This means that the video is not downloaded to the viewer's hard disk before it can be watched, rather, it is transmitted synchronously.

Main problems when contacting the students

Respondents reported the problems they faced with each method of contact. Four out of 23 respondents reported that they did not face any problem. Some of their comments are shown in table (6.2):

Table 6.2: Main problems with method of contact with students

<table>
<thead>
<tr>
<th>Problems with:</th>
<th>Psychological</th>
<th>Communicational</th>
<th>Technical</th>
<th>Economical</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail (86.9%)</td>
<td>- Time consuming to capture the right tone and &quot;feel&quot; of E-mail messages</td>
<td>- Not enough interaction</td>
<td>- Overloading of messages</td>
<td>- Hard to track</td>
</tr>
<tr>
<td>WebBoard (82.6%)</td>
<td>- No privacy, intimidating</td>
<td>- Time consuming to read and reply to every message</td>
<td>- Overloading of messages</td>
<td>- Problems with multiple boards</td>
</tr>
<tr>
<td>Chat on the Web (65%)</td>
<td>- Typing is not as fast and comfortable as speaking</td>
<td>- Problems with timing</td>
<td>- Needs updating</td>
<td>- Limitations of the communication channel</td>
</tr>
<tr>
<td>Telephone (56%)</td>
<td>- Not practical</td>
<td>- Scheduling, hard to connect</td>
<td>- Costly</td>
<td></td>
</tr>
<tr>
<td>RealAudio (47.8%)</td>
<td>- Lack of interactivity</td>
<td>- Slower pace discussion</td>
<td>- Breaks in the connection</td>
<td></td>
</tr>
<tr>
<td>Videoconferencing (8.7%)</td>
<td>- Time lag, ineffective</td>
<td>- Changes needed to students' computer configuration</td>
<td>- Costly</td>
<td></td>
</tr>
<tr>
<td>Webcasting (8.7%)</td>
<td>- Delays</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-way audio and one-way video (4.3%)</td>
<td>- Not well established means of communication among the students</td>
<td>- Lack of personal contact with students</td>
<td>- Traffic</td>
<td></td>
</tr>
</tbody>
</table>

One general recommendation by one of the respondents was that "some students are not comfortable with some methods, thus we (the lecturers) use their first choice". The summary of findings shown in this table (6.2) indicates that most of the problems were with the communicational aspects of contacting the students through this vast range of technologies. The factors affecting the effectiveness of communication were time lag, lack of interaction, limitations of the communicational channel, and slower pace discussion through RealAudio. However,
none of these factors diminished a great deal the lecturers' outcomes about either their satisfaction with DE, the effectiveness of DE by the Internet, or the acceptability level of the DE.

**Frequency of contact with students (face-to-face meetings)**

There were six options of possible answers available for the question about the frequency with which the lecturers contact the students and the results are given in figure 6.2.

![Contact with students (face-to-face meetings)](image)

**Figure 6.2: Contact with students (face-to-face meetings)**

The most frequent level of contact with students was once per semester. The lecturers who chose the option "others" commented that: (a) "My course was too short to have face-to-face meetings" (three months, summer course) and (b) "As needed".

**Benefits and advantages of DE via the Internet**

Lecturers were asked to report, the positive aspects, advantages, and benefits when teaching at a distance in an open-ended format. The categories listed represent a summary of the lecturer's comments.

- Reach a wider audience of students (8)
- More convenience allowed by the technology (3)
- Easy integration of the resources available on the WWW allowed by the Web-based medium (2)
- Students who missed the class can review the on-line material since they are now archived (2)
- Enrichment of the traditional education (1)
- Less costly for students (1)
- Not having to give the same lectures repeatedly since they are now recorded (1)
- More flexibility to students (1)
- Constructivist theories of instruction (1)
- None (1)

Reaching a wider audience of students was the aspect most mentioned by the lecturers, indicating that it is considered to be the most beneficial and advantageous aspect of teaching at a distance via the Internet. Even though the lecturers were not asked to consider the benefits for the students, they were still indirectly considered. For instance, three of the eight categories determined above, mention the benefits from a students' perspective. (a) less costly for students, (b) students can now review material that is archived and (c) more flexibility for students. These positive aspects are not only providing benefits to the students but also to the lecturers due to their effort in using the technology to enrich the teaching process.
Requirements for teaching at a distance via the Internet

Lecturers were asked to comment on their requirements for teaching at a distance via the Internet. The very open-ended nature of this question was maintained although the previous survey had led to a categorization. The response rate of this question was over 90% of the 23 respondents. These comments were categorized into the following:

- Technical support (4)
- None (4)
- Familiarization with the technology (3)
- Informal training (3)
- Enthusiasm and interest (2)
- Infrastructure and time (2)
- Understanding of the basic principles of DE (2)
- Access to a computer with Internet (1)
- Low level programming (1)

This was, in fact, very similar to the previous case study (chapter 5). The few additions were due to the usage of different technologies by the North American University and the University in Northern Ireland. This is another indication that confirms the highly significant role technical support plays in DE. The next section presents the results of the lecturers' reactions to the technical support.

Technical support

Lecturers were asked to comment on whether or not they were receiving enough technical support. The response rate was over 90%. The overall result was very positive. The majority of the surveyed lecturers (18 out of 21 respondents) felt they had enough technical support. No one answered "no" to this question and there were only three lecturers (14.29%) whose answer was "sometimes". Not every respondent decided to express their comments on whether or not they were receiving enough technical support. However, the reasons for their positive responses were:

- The existence of technical support staff
- The academic outreach unit
- The Teaching Assistants (TAs) who play the role of the technical support staff
- The presence of a technician at every live session (synchronous sessions, i.e. video, audio) who could be reached by the students through a free telephone line number

The reasons for the lecturers having enough technical support "sometimes" include:

- Unexpected technical problems
- There were three technical members of staff required by the programme. One of them is hired to be on-line, a second one to videotape and a third one to Web cast and produce (No-one is entirely dedicated to provide technical support to students asynchronously).

Having analysed these outcomes, it was possible to make the assumption that in this North American University in particular, there is sufficient technical support. This is a possible evidence of an outcome in which the attitudes towards technology in general and therefore technical support in particular, have been influenced by cultural and economic factors. Not surprisingly, the crucial role of the technical support within a DE setting is acknowledged by the North Americans. This view is further discussed in section 6.6 of this chapter.
Time spent on learning to operate the technology

There was a response rate of over 90% to this open-ended question. The analysis of these answers revealed the following:

- Previous knowledge was sufficient, therefore no time was spent (5)
- One to two hours (4)
- 15 - 20 hours (3)
- Ongoing process (3)
- Three to five hours (2)
- Six to nine hours (2)
- Ten to 14 hours (1)

These categories have indicated that time spent on learning to operate the technology was not a major issue. Some needed more time, but most of the lecturers did not need to spend a great deal of time on this process and thus it did not interfere with either their academic duties or their teaching activities.

Specific recommendations about the usage of the Internet for distance teaching

Slightly more than a half of the respondents gave recommendations about the usage of the Internet for distance teaching. The analysis of their recommendations leads to two groups of categories: (a) recommendations about the specific tasks, and (b) recommendations about the general tasks.

(a) Recommendations about their needs to perform specific tasks (8):
- Receive appropriate technical support (3)
- More effort to involve and to be in touch with all the remote students to make sure that they participate in discussions, either synchronously and asynchronously, and that they remain engaged with the course (2)
- More commitment to the DE programme (1)
- Provide sufficient feedback to students on a regular basis (1)
- Provide appropriate social support to students (1)

(b) Recommendations about the general tasks (5):
- Explore the instructional technology as it evolves so that it can be fully exploited and so appropriately chosen for each aspect of DE (3)
- Update pedagogy so that it suits DE (2)

Two categories were mentioned three times by the lecturers. They were concerned with the technical support and the exploitation of the technology to suit specific tasks. For example, one of the lecturers commented that: "think about what you can use the technology for to do things differently, not simulate classroom".

In the next section, lecturers' reactions towards the usability of the Internet for DE are presented. This section is divided into three variables: their reactions to on-line material, the effectiveness of DE via the Internet, and their level of satisfaction with DE via the Internet.

6.4.3 Usability of the Internet for DE

Lecturers' reactions to on-line material

Since most of the lecturers surveyed (74%) at this University were responsible for developing their own on-line material published on the Web, this question was not applicable to them. Consequently, of the 23 lecturers surveyed, just over one quarter could rate their reactions. The format of this question was closed with a range of five options to be rated by the lecturers. There was a five-point rating scale from the most negative to the most positive. There were no negative average scores regarding the lecturers' reactions towards the teaching material. The average score was 4.00, which indicates that the lecturers rated the teaching material as being "somewhat wonderful". Table 6.3 shows the results.
Table 6.3: Lecturers' reactions to on-line material

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating D: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.50</td>
</tr>
<tr>
<td>Rating B: &quot;frustrating&quot; = 1 to &quot;satisfying&quot; = 5</td>
<td>3.50</td>
</tr>
<tr>
<td>Rating E: &quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>3.66</td>
</tr>
<tr>
<td>Rating C: &quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>3.83</td>
</tr>
<tr>
<td>Rating A: &quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td>4.00</td>
</tr>
</tbody>
</table>

The overall outcome was positive because the lecturers, who were not responsible for choosing their teaching material, chose relevant material available commercially. They probably had to take some time making careful decisions about the appropriate material for their classes so that they could adopt it for official use. As such, careful consideration of what was available on the market seemed to have been the key element that led to such a positive reaction to the on-line material.

Figure 6.3: Reaction to on-line material - Rating A: Terrible to Wonderful

Effectiveness of DE via the Internet

This item was presented to the respondents in a form of a rating scale from one ("ineffective") to five ("very effective"). Five tasks were identified for measuring the effectiveness of DE via the Internet: (a) "Lectures", (b) "Seminars: students' participation", (c) "Seminars: discussion", (d) "Consultation with student: one-to-one" and (e) "Group work". The option NA for "Not Applicable" was also available for the lecturers whose experience with DE was not sufficient for them to rate this appropriately.
a) Effectiveness of DE for consultation with the student

The most positive response was given to the aspect "Consultation with student: one-to-one". Figure 6.4 shows this result.

![Consultation with student: one-to-one](image)

**Figure 6.4: Consultation with student: one-to-one**

Figure 6.4 clearly demonstrates that the lecturers expressed a positive opinion about the level of effectiveness of DE via Internet for individual consultation with the student. The mean value for this task was the highest (3.73) of all five tasks considered, this is interpreted as being "effective". There were no negative outcomes. The summary of the results regarding the effectiveness of DE via Internet is shown below (table 6.4).

b) Summary of the results regarding the effectiveness of DE via the Internet

**Table 6.4: Summary of the results regarding the effectiveness of DE via the Internet by the lecturers**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3.50</td>
</tr>
<tr>
<td>Seminars: discussion</td>
<td>3.54</td>
</tr>
<tr>
<td>Group work</td>
<td>3.70</td>
</tr>
<tr>
<td>Seminars: students' participation</td>
<td>3.71</td>
</tr>
<tr>
<td>Consultation with student: one-to-one</td>
<td>3.73</td>
</tr>
</tbody>
</table>

The shaded row indicates the most positive response. Consultation with student received the highest score because this is the easiest way of CMC (Computer-Mediated-Communication). As seen in the previous chapter (5), as the number of students and thus the number of sites increases, it becomes consequently more complex.

**Satisfaction with DE via the Internet**

A rating scale from one to five measured lecturers' level of satisfaction. Value "1" for dissatisfaction and value "5" for satisfaction. The distribution of the results is illustrated in the following figure (6.5).
Figure 6.5: Lecturers' level of satisfaction with DE via Internet

Figure 6.5 indicates that nearly half of the respondents, eleven out of 23, were "somewhat satisfied" with DE via Internet. Five out of 23 respondents (21.74%) were "satisfied". On the other hand, only one (4.35%) expressed "dissatisfaction" regarding DE via the Internet.

Comments from the lecturers whose ratings were positive, "somewhat satisfied" and "satisfied" fall into the following categories:

(a) Pragmatic (7): there were seven out of 15 comments that fall into this category. This suggests that lecturers were satisfied due to the effectiveness of the technology for performing specific tasks. For example, one of the lecturers reported that the technology he/she uses works "fine". Another lecturer pointed out that the process of teaching at a distance was satisfying but it was "very time-consuming". Another pragmatic aspect refers to the need for appropriate technical support. The students' active role was also mentioned as being determinant of a satisfying distance teaching process.

(b) Student centred (5): lecturers attribute their satisfaction to the students' feedback, needs and progress.

(c) Psychological/emotional (1): one of the lecturers commented that he/she "enjoys this mode of teaching" and "feels that students learn effectively".

(d) Communication (1): despite one of the lecturers having a positive attitude towards satisfaction, he or she wished to have contact with the remote students on a face-to-face basis.

(e) Technical limitations (1): one of the lecturers highlighted that: "it was a great experience". However, the lecturer felt that the unreliable technical connections interfered with delivering of material which meant that they would occasionally have to improvise or use the telephone. It was also felt that it "would have been better to have more interaction between on-line and in-site students".

There were three comments from the lecturers whose ratings were rather negative: "somewhat dissatisfied" and "dissatisfied". One of these lecturers argued that he/she prefers face-to-face contact with students. The other two lecturers based their arguments for not being satisfied on the outcomes of the students' evaluations.

On the other hand, there were four comments from the ones whose reaction was neutral. Two lecturers explained that they were neither satisfied nor dissatisfied due to the technical limitations. For example, one of these lecturers pointed out that "the technology still needs to be enhanced (video and audio)". Another lecturer based his/her justification on the pragmatic and economic aspects of DE. He/she reported that "it is a trade-off, increased enrolment and reaching a broader audience versus increased workload and the relative anonymity of distance learning". Lastly, there was one comment about the issues of communicating at a distance. This respondent still prefers "the high interaction (face-to-face) with students" and likes "non-verbal feedback you get in the face-to-face setting" although he/she added: "the outcomes were still very high".
6.4.4 Acceptability of multiple educational technologies for DE

When lecturers were asked whether DE via Internet was a good way of teaching, over three-quarters answered "yes". Only one lecturer gave a negative view. There was a response rate of nearly 80%.

Comments from the lecturers whose answer was positive include:

(a) Student centred (3): for example, one of these lecturers reported that "students get help when they need it" and the other lecturer pointed out that DE through multiple technologies was "helpful to students who have no other alternatives". The other comment that falls into this category was "better for some students than for others, does accommodate different lifestyles and home locations".

(b) Communication (1): this lecturer argues that in DE there is more contact between lecturers and students, and students participate more than in face-to-face settings.

(c) Technical capabilities (1): one of the lecturers reported that the technology allows her to effectively present material and communicate with students.

(d) Pragmatic (1): there was one lecturer who mentioned that DE through multiple technologies had provided him with a method to reach and teach students effectively and successfully.

(e) Academic (1): there was one lecturer who said that the content of her class was relevant to the multiple instructional technology.

There was only one lecturer whose attitude towards the acceptability of the multiple technologies for DE was negative. She reported that: "I think that augmenting regular classes with technology is fine but the 70-80 hours per week that the class took was absurd". One of the lecturers whose answer was either "yes" and "no" commented that "yes, for some students, not for all. It's good for those who can't move to campus and it is better for technology aware students. It can be a difficult experience for students who want on-campus life recreated on-line".

There are several factors that affect the acceptability of multiple technologies for DE by the lecturers, however, this analysis has shown that predominant reaction of the lecturers was good. The next section presents the lecturers' preferences for traditional education, DE or both if they were offered the choice.

Lecturers' preferences

The response rate for this question was just over 95%. The number of lecturers (over 50%) whose choice was "traditional education" was higher than those choice was "DE" (slightly over than a quarter) or "both" (18.2%). Since slightly more than a half of the respondents chose "traditional education", this indicates that the overall outcome was favourable to the traditional means of education. The attitudes of the lecturers whose choice was "traditional education" were categorized as follow:

(a) Communication (3): for example, two of these lecturers "would generally prefer to have face-to-face" but would like the traditional setting with the benefits and advantages of the instructional technologies for DE. Another lecturer not only "enjoyed" the traditional setting because of the personal interaction with students but also "relied heavily on non-verbal communication".

(b) Pragmatic (3): there were three lecturers whose choice was based on the pragmatic advantages of DE for reaching a wider audience and the increased flexibility, but they would still prefer the traditional way of teaching whenever possible.

(c) Psychological/emotional (3): three lecturers explained that the traditional way of teaching was more satisfying, more personal and more familiar than teaching at a distance through multiple technologies.

(d) Lack of choice (2): two lecturers would have preferred to teach traditionally but had no choice but to use DE.

A lecturer who preferred the dual mode of delivery explained that "each (traditional education and DE) has its own strengths". One of the lecturers had no preference since she believes that, "with practice, the off-campus
version will be as successful as the on-campus version". Another lecturer was convinced that DE could be "as good as well". Another example is the comment in which the lecturer prefers to alternate, teaching traditionally the same course in one semester and via DE in the following semester because she points out that "each informs and enriches the other".

Finally, lecturers whose choice was DE argued that it is preferable because it reaches a wider audience of students, "given the appropriate technology". Other comments were that DE was more appropriate for the course being taught and that all the classes were taught as distance courses.

The way lecturers see DE

Lecturers were asked to specify their view of DE by selecting one of the following options: (a) "An alternative to traditional education", (b) "A substitute to traditional education", (c) "An attempt to simulate traditional education", (d) "all the three options above" and (e) "Others" as an encouragement to make them express any other view. Nearly half (43.5%) of the respondents saw DE as an alternative to traditional education. Only one of the 23 respondents saw it as a substitute. Three respondents out of 23 saw DE as an attempt to simulate traditional education. A fourth option "all the three options above" (alternative, substitute and attempt to simulate) was selected by two respondents (8.7%). The option "others" was completed by one third of the respondents whose views are presented below:

- "An extension and elaboration of traditional education"
- "An extension"
- "A complement to traditional education"
- "A complement"
- "Another option for delivering education"
- "Is the only possibility for education for students who do not live near a college or university that offers the training/programme they need for their education"
- "Seems more like a merging (...) today's classes fall somewhere along a spectrum of degree to which Internet communication and resources are used"

For most of the lecturers, it is an alternative for different purposes. It is not a substitute but bears a complex relation to traditional methods.

Subject matter and activity for DE via the Internet

Lecturers were asked to complete a question about the appropriateness of the different kinds of subject matters and activities to be taught at a distance via the Internet. Every lecturer surveyed completed this question explaining their views in a variety of ways. As the answers given were diverse, seven categories were set out to summarize the nature of their views:

- All types (10)
- More theoretical type of subject matter (5)
- I am not sure (3)
- Text-based type of subject matter (2)
- Type of material taught in postgraduate and professional programmes (1)
- Discussion-based concepts (1)
- I do not know (1)

One of the determinants of the success of the use of the instructional technology for DE is the ability of the technology to suit the nature of the course material (Hiltz, 1994). This suitability is strongly associated with the kind of the subject matter or activity being taught at a distance. At the moment, it appears that the technology is not providing the appropriate support for the type of activity or subject matter that require physical interaction, 'hands on activities', or equipment (e.g. art, machine repair and lab work).
Meeting lecturers' expectations

The majority (70%) of the lecturers surveyed had their expectations met. Only one lecturer in 23 was indecisive, his/her comment was "more or less". On the other hand, just over one quarter of the respondents did not have their expectations met. Seventeen respondents (74%) added comments. The comments from the lecturers whose expectations were met fall into the following categories:

(a) Positive feedback (8): eight out of twelve comments were based on the positive evaluations of the student and their reactions to DE via the Internet.

(b) Communication/Positive feedback (2): there were two comments related to the rise in the level of students' participation and involvement with the course at a distance.

(c) Pragmatic (2): one of these lecturers reported that it "allowed more students to participate, flexibility for student learning (...)"

The lecturers whose expectations were not met explained their reasons as follows:

(a) Cost/benefit (1): one of the lecturers pointed out that "(...) the time (cost) spent and the benefits were nowhere near each other".

(b) Technical limitations (1): another lecturer commented that the "technology hasn't quite caught up with our ambitions. We need faster connections, more bandwidth and better Web interfaces for using mathematics".

(c) Communication (2): two other lecturers felt that there was a need for more interaction so that communication among students and between students and lecturers could be more effective.

Analysis of the lecturers' comments clarifies the fact that not only the overall outcome was positive, but the reasons for their expectations being met was based on the students evaluation feedback. This means that the lecturers expected, above all, to satisfy the students' expectations. A discussion of the analysis of the students' expectations is presented later in this chapter.

Lecturers would teach via the Internet again

Lecturers were asked whether they would continue teaching at a distance via the Internet. The majority of the answers was "yes". Only one lecturer would prefer not to teach that way again. This lecturer explained that he/she does not "think that the technology is ready to support it (...)". Slightly more than two thirds of the lecturers would teach via the Internet again because they "enjoyed" it, it is "very effective", grant funding was awarded and it was an "interesting" and "positive experience". However, they would argue for more "sophisticated support", i.e. "audio/video" and "acknowledge that it takes more work than face-to-face teaching" so that they should be "compensated accordingly".

Further comments or issues

Half of the surveyed lecturers expressed their comments or issues. These responses are summarized into three categories:

(a) Technical recommendations (2): one of the lecturers reported that "you absolutely must have able and reliable technical people: it is essential that the teachers be able to focus on their teaching and not be distracted by their own or students' technical glitches - technical people are there to take care of that aspect of the class, especially during (but not limited to) synchronous sessions. If you don't have good technical people and technical support, don't do distance education via the Internet - it will just make everyone involved crazy".

(b) Communication (5): five lecturers expressed the view that communication among the students and between students and lecturers was a crucial issue in DE. They highlighted the extra effort needed to keep students engaged and involved with the course.
five lecturers commented on the academic aspects of teaching at a distance. For example, one of these lecturers pointed out that there is a need "to continue to explore as it evolves". Two lecturers stressed the inadequacy of the current pedagogy for DE programmes via the Internet. They pointed out that the current pedagogy needed to be reviewed in order to suit the advances in modern teaching techniques. Another aspect was reported by a lecturer who responded that the faculty needed to be committed to providing education of a high standard regardless of the medium. The last comment was: "think about what you can use the technology for to do things differently, not simulate classroom".

The comments on the importance of the technical support and the issues of communication between students and lecturers and among the students demonstrate that the lecturers were very aware of the academic implications and issues of introducing a DE programme. The next section outlines the analysis of the students' responses to learning through the Internet.

6.5 Students' responses to learning through the Internet

This section discusses the analysis of the students' responses to DE via the Internet. The samples (A, n=17 and B, n=19) were analysed separately and are presented in this section. A comparison of the data from both samples is then presented and discussed. In order to introduce the context of each sample of students, a brief description of the DE programme in each department is presented. This includes the teaching process and the technologies used.

DE in the Department of Library and Information Sciences

The DE programme of the Department of Library and Information Sciences has broadened its original scope to reach students who would not be able to relocate to campus for a Masters accredited degree course. This programme is unique among the other Departments of Library and Information Sciences because of its extensive use of Internet technologies to organize and manage electronic information for instruction and independent learning in combination with brief periods of on-campus instruction. Students are provided with the flexibility of choosing their site of instruction (e.g. home or work). Courses may involve up to two hours per week of live Internet interaction at a regularly scheduled time. Further communication with lecturers and course work is accomplished at times convenient to the student. In addition to the Web pages designed by the lecturer, students use textbooks, course packs, and materials available at libraries near their homes or obtained with assistance from the University library. Most of the synchronous sessions with lecturers are actually recorded and made available via RealAudio from the programme's Web pages. Students also have the flexibility to choose from a range of elective courses to complete their degrees. They consult with faculty advisors to plan their programmes of study to best suit their individual needs and specific career goals. Students are expected to be able to learn independently. Basic computer literacy requirements are needed but additional technological knowledge is not required, though it is an advantage. The necessary technology must be available at work or at home. This includes hardware (either Unix, IBM compatible or Macintosh personal computers with multimedia capabilities), software, and network connectivity. The technology in use supports the following activities:

- The asynchronous discussions are via a bulletin board and the discussions are via threaded text messages and audio responses to text messages;
- The synchronous sessions are class presentations by faculty, students and guest lecturers, and group Web browsing, text-chatting, and desktop sharing rooms are used for small discussions;
- Archive of 'live' sessions includes audio, images, and text - with events synchronized for playback; and
- The creation, edition, and sharing of documents on-line do not require leaving one's Web browser.

In order to perform these activities, the technology includes the following tools: two-way audio and one-way video/RealAudio, multimedia presentations (non-linear slides), chat on the Web, WebBoard, and e-mail.

DE in the Department of Mathematical Sciences

The programme of the Department of Mathematical Sciences offers its students the freedom to achieve a better conceptual understanding of mathematics when compared to traditional courses, as well as good knowledge of the methods of problem-solving. The programme is committed to extending traditional learning to students who normally would not have such opportunities. Many students participate in this programme, including the students...
who could not fit the class into their schedules and adults who would like a stronger background in calculus. Students get credits that can be transferred to almost any other university in the US and possibly elsewhere. To enrol in this programme, students do not necessarily need to be registered students of this University. The programme offers ten courses of different levels of calculus and uses Mathematica software.

There are 25 mentors who provide support to students. They are the communication link between students and lecturers. The mentors are former students who have excelled in calculus and Mathematica courses, either on campus or through the DE programme. Each student is assigned a mentor when enrolling in the programme. The mentors' duties include: informing their students of procedures for grading (they are responsible for grading all homework and quizzes), commenting on the students' homework with suggestions on how to improve their performance on assignments, and providing feedback to students' questions pertaining to their assignments via e-mail, telephone or a message in the chat room of the programme. If there is a question that the mentor is unable to answer, he or she passes it on to the appropriate lecturer. Since students can call their mentors at any time during office hours, they are very committed to providing responsive feedback to students. Finally, mentors monitor their students' progress throughout the course. This programme is designed for students who are organized, able to learn independently, motivated to earn credit in a university level calculus course, have time to dedicate to the course, and have the desire to learn.

Communication is an essential aspect of the teaching process. Students are advised to contact their mentors at least once a week. As communication is considered to be an expression of participation, poor communication may cause a lower grade whereas good communication could raise it. Students are expected to complete their assignments, which are made available through the Web page of the programme, to submit their homework, and to attend the on-line discussion sessions, which are equivalent to the discussions held in on-campus courses.

Although the complete technology requirements are slightly more sophisticated for these students, their communication channel does not include video or audio interaction such as in the case of the students form the Department of Library and Information Sciences.

6.5.1 Students' background

Sample A:

The students of sample A were in their thirties (40%) and twenties (35%). Most of them were female students whose highest degree was BSc, who worked part-time and were seeking to earn a Master degree. Nearly 90% were White/Anglos whose first language was English. Over two thirds of the students were quite experienced with learning at a distance via the Internet. Most of them had been learning this way for more than two years. They were also quite experienced with using computers. Over one third of the students had been using computers for more than nine years. Slightly more than half were using computers for more than five years. Most of them had had experience in learning at a distance via the Internet since the previous academic year. Forty-percent of the students had had experience of using the Internet for between five to seven years. Sixty-percent of the students had had training in IT before.

Sample B:

Nearly half of the students of sample B were in their twenties and one third in their thirties. The majority were male and were studying for a BSc degree. Most of them were full-time students but 40% were in part-time education and working in a variety of sectors. Most of them were White/Anglos and English was their first language. However, 10% were Hispanics/Latinos and Asians whose first language was not English. Most of them (60%) had had previous experience of learning at a distance via the Internet. They were quite experienced with using computers. The majority of the students (80%) had been using computers for more than nine years. They were also fairly experienced at using the Internet. Over one third of the students had been using the Internet for between three to five years. Nearly half of the students had had previous training in IT.

Students' expectations

The answers given to the open-ended question about the students' expectations of the distance learning were analysed and categorized as follows (see the list below). The numbers in brackets indicate the number of times these aspects were mentioned by the students.
Sample A:

- To complete degrees (6)
- To avoid or minimize travelling (3)
- Flexibility (3)
- Effective learning (2)
- Quality (2)
- Convenience (1)
- Self-paced learning (1)
- To enjoy learning at a distance via the Internet (1)
- To develop their skills (1)
- To earn professional accreditation (1)

Sample B:

For the students of sample B, the most important expectation was flexibility.

- Flexibility (5)
- Self-paced learning (3)
- Get credits (3)
- Effective learning (3)
- Professional development (2)
- New way of learning (2)
- Easy communication with lecturers (2)
- "To learn" (2)
- "Pass of an A" (1)

The differences in expectations between the samples could be related to gender, since most of the students of sample A were female and most of the students of sample B were male. However, at this stage there is not sufficient evidence to support this hypothesis. Studies on gender differences in DE have reported that most of the differences are related to learning styles, communication styles, and technical barriers (Blum, 1999). As the analysis of the data progresses, there may be more evidence indicating that gender can be viewed as one of the factors that determines differences in students' responses.

Reasons for learning at a distance via the Internet

Sample A:

The most important reason for students from sample A taking a course at a distance via the Internet was the fact that they did not need to travel in order to get their education in a highly reputable institution with accredited courses. Such courses would not otherwise have been accessible to students who do not live near the University campus. As they were working and some of them had families, it would not be convenient for them to have to move or commute, therefore there were eleven out of 17 comments related to "no need to travel or commute". The list below indicates the aspects that motivated the students to take a DE course through the Internet. The numbers in brackets indicate the frequency with which they were mentioned by the students:

- No need to travel or commute (11)
- Reputation of the course (3)
- Part of the programme (2)
- Convenience (2)
- Previous positive experience (1)
- Flexibility (1)
- Learn more about IT (1)
Sample B:

- Flexibility (10)
- Convenience (4)
- No need to travel (2)
- Experience of the department with DE through the Internet (2)
- Quality of the course (2)
- Effective learning (2)
- Self-paced learning (1)
- Reputation of the University (1)
- Get a degree (1)
- "Nothing else to do over the summer" (1)

Differently from the students of sample A, the students from sample B were more motivated by the flexibility DE via the Internet offered (i.e. flexibility refers to schedule and time), and therefore by the convenience of this way of learning. This is a typical example of how DE programmes can be designed to suit a specific students' profile as they vary according to their age, gender, subject matter of the course, interests, and needs. Later in this chapter, this aspect is discussed further (sections 6.6 and 6.7) along with other evidence presented throughout this analysis.

6.5.2 Usage of the Internet for DE

Students' role when learning at a distance through the Internet

Students were asked to rate their roles when learning at a distance through the Internet. The layout of the question was kept unchanged (see section 5.2.1, chapter 5). On average, students reported that being more self-disciplined was important but they were somewhat neutral about having to work twice as hard. Table 6.5 summarizes these results:

Table 6.5: Students' role when learning at a distance via the Internet

<table>
<thead>
<tr>
<th>Students' role</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have to be more self-disciplined</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>I have to be more independent and to have self-control</td>
<td>1.8</td>
<td>2.0</td>
</tr>
<tr>
<td>I have to work twice as hard</td>
<td>2.8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

The option "others" was completed by three students from sample A and two from sample B. Students from sample A added that having to use time "very carefully" and being organized were very important but being "quite motivated" was not so important. Conversely, there were two students from sample B who added that being "very motivated" was very important as well as "learning for mastery". Results from sample A reveal that the most important role was to be more self-disciplined which does not significantly differ from the results obtained from the students of sample B. These roles were all somewhat important to them, however, students from sample A considered them slightly more important than the ones of sample B.

General problems with distance learning via the Internet

Students rated eleven aspects related to general problems when learning at a distance via the Internet. A list of these ratings is presented in table 6.6:

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134
Table 6.6: Summary of the results

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean(A)</th>
<th>Mean(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigating on the Web can be time consuming and distracting</td>
<td>3.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Lack of face-to-face meetings with faculty and classmates</td>
<td>3.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Not being able to know whether I am doing well or badly</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Problems related to the connection with the server</td>
<td>3.8</td>
<td>3.5</td>
</tr>
<tr>
<td>Lack of socialization/Isolation</td>
<td>3.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>4.0</td>
<td>3.7</td>
</tr>
<tr>
<td>Lack of supportive atmosphere of traditional classrooms</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Lack of teaching support</td>
<td>4.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Lack of freedom of expression</td>
<td>4.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Lack of confidence with the technology</td>
<td>4.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Lack technical support</td>
<td>4.9</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Too problematic = 1 and No problem at all = 5

There were no negative outcomes from students of both samples since all the mean values are above the neutral value (3.00). However, students from sample A found that they had good technical support. Comparatively, students from sample B were less positive about the technical support, but they were not negative. The less positive outcomes were "navigating on the Web" for the students from sample A and lack of socialization/isolation from the students of sample B who were neutral about it. Figure 6.6 illustrates these results, which show that the distribution is bimodal: ten students perceived a real problem with isolation, eight did not.

![Figure 6.6: Lack of socialization/isolation by the students of sample B](image)

There was an option "others" to be completed as an open question. Two students from sample A added respectively that "lack of feedback like in conventional classroom" was quite problematic as well as "group projects". There were two students from sample B who highlighted the teaching support as being insufficient, however, the overall result was quite positive.

Main methods of contact with lecturers

Six options were available for this question: (a) "WebBoard", (b) "e-mail", (c) "chat on the Web", (d) "RealAudio", (e) "telephone" and (f) "others". Results indicate that the most popular method of contacting the faculty was the e-mail followed by chat on the Web and RealAudio. Table 6.7 shows the summary of the results:
Table 6.7: Summary of the results of the main methods of contact with lecturers

<table>
<thead>
<tr>
<th>Method of contact</th>
<th>Freq.(A) n=17</th>
<th>Freq.(B) n=19</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Chat on the Web</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>WebBoard</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>RealAudio</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Telephone</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Others: Face-to-face meeting (A) and Telnet (B) respectively</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Results indicate that the options WebBoard and RealAudio were widely available and used by the students of sample A, however, students from sample B used the telephone to contact their lecturers much more since the two options mentioned were not popular between these students. This is an example of suitability of the media to the subject matter being taught. Students from sample A benefited a great deal from using WebBoard and RealAudio as their subject matters were all related to Library and Information Sciences, whereas students from sample B, were studying subjects from the Mathematical Sciences and therefore, the use of WebBoard and RealAudio were not popular.

Frequency of use of the means of communication during DE via the Internet

In order to investigate the frequency of use of several means of communication, students were asked to provide the frequency with which they used the following in their course.

Table 6.8: Summary of the results - the frequency of use of the means of communication during the course

<table>
<thead>
<tr>
<th>Items used</th>
<th>Mean(A)</th>
<th>Mean(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fax</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Express mail (fast delivery)</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Voice-mail (Answer machine)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>US Post Office</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Face-to-face meeting with faculty</td>
<td>0.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Face-to-face meetings with class mates</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Telephone</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Video/Audioconferencing</td>
<td>3.9</td>
<td>0</td>
</tr>
<tr>
<td>Chat room on the Web (Real time, text-based computer communication)</td>
<td>5.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Printer</td>
<td>6.2</td>
<td>3.4</td>
</tr>
<tr>
<td>E-mail (file transfer and messaging)</td>
<td>6.3</td>
<td>5.5</td>
</tr>
<tr>
<td>WebBoard</td>
<td>6.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>

The ratings were based on the following scale:

"Do not use/not available" = 0
"Once per semester" = 1
"Every two months" = 2
"Once per month" = 3
"Twice per month" = 4
"Every week" = 5
"Every three days" = 6
"Nearly every day" = 7

According to this scale, students from sample A used the chat on the Web, e-mail, printer and the WebBoard twice per week. However, students from sample B used the e-mail and the printer slightly less often than the students from sample A.
Main problems with each method of contact with lecturers

The next table (6.9) presents a summary of issues encountered by the students when contacting the lecturer. The nature of the problems were similar to the ones found in the previous case study (chapter 5), however, there are a number of issues that arose from the means of communication used in this case study. For example, contacting mentors or lecturers by telephone to talk about specific details of a mathematical problem can be costly and difficult (for students of sample B). On the other hand, students from sample A found some other issues when communicating through RealAudio and WebBoard. These issues affected the communication between students and lecturers but they are common issues that will be solved as the technology evolves. Despite these issues, the use of these means of communication was quite successful since problems were reported by a minority of the students.

Table 6.9: Main problems with each method of contact with lecturers

<table>
<thead>
<tr>
<th>Contact by</th>
<th>Sample (A)</th>
<th>Sample (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E-mail</strong></td>
<td>- Time lag - Lecturers are not always responsive - Not always possible to ensure if messages were received</td>
<td>- Impersonal - Not perfectly suitable for mathematics - Time lag - Appointments are missed due to inability to check it regularly - Difficult with homework problems with mathematics - Lecturers are not always responsive</td>
</tr>
<tr>
<td><strong>Chat</strong></td>
<td>- Difficult to determine 'tone' from text - Time lag - Limiting - Frustrating when many students are sharing the lecturer's attention - Can be confusing sometimes - Lack of privacy - Lecturers are not always responsive - Communication is confusing among more than two people</td>
<td>- Difficult to understand what lecturers were trying to explain - Not enough time to chat - Difficult to specify details with problems with mathematics - Time lag - chat schedules do not match</td>
</tr>
<tr>
<td><strong>WebBoard</strong></td>
<td>- Difficult to determine 'tone' from text - Time lag - must be checked regularly in order to be effective - Lack of confidentiality - Time consuming - Lecturers are not always responsive</td>
<td>- Time lag - Needs moderation to avoid repeating questions</td>
</tr>
<tr>
<td><strong>RealAudio</strong></td>
<td>- One-way from faculty only, students cannot talk back, can only type back - Net congestion sometimes - Time lag - Lip smacking, coughing can be disturbing - Disconnection sometimes - Impersonal, lack of face-to-face contact</td>
<td>- Unfamiliar</td>
</tr>
<tr>
<td><strong>Telephone</strong></td>
<td>- Scheduling difficulties</td>
<td>- Difficult to specify details - Costs - Not perfectly suitable for mathematics specially when programming codes need to be shown (or shared)</td>
</tr>
<tr>
<td><strong>Face-to-face</strong></td>
<td>- Number of meetings is insufficient</td>
<td>- No data</td>
</tr>
</tbody>
</table>

Technical support

As revealed by previous studies, technical support plays a crucial role in determining the effectiveness of a DE programme. If it is insufficient or non-existent, the students' usability level is diminished. However, the results of this study reveal that over two thirds of the students were receiving enough technical support.
Sample A:

The students from sample A unanimously reported that they were receiving enough technical support. They complimented the technical staff of the department a great deal. A list of examples of terms used to express their satisfaction is presented: "wonderful (2)", "great", "excellent (2)", "very responsive and knowledgeable", "respond promptly", "outstanding, helpful, creative, responsive and communicative", "the best" and "fantastic".

Sample B:

Nearly 60% of the students from sample B reported receiving enough technical support. Twenty percent were receiving it sometimes and the same percentage of students reported that they were not having enough technical support. Students who were receiving enough technical support or having it sometimes reported that they did not experience any problems or if they did they would solve them by themselves. Conversely, students who reported not having enough support commented that the operational system used was unknown to the technical staff and that no one would help.

To conclude, on average, most of the students from both samples were receiving enough technical support. The results from sample B reveal that students who were taking a degree in Mathematical Sciences required very little technical support compared to the students taking a degree in the Library and Information Sciences. This is an example of how students who are technically competent cope with their own problems quite independently and successfully. Furthermore, this finding may lend support to Blum (1999) that gender does have an impact on the level of technical support needed. Despite that, students of the Library and Information Sciences were unanimously satisfied with the technical support received and were very complimentary about it. This is an interesting comparison showing a wise allocation of resources by both departments to ensure effective DE programmes of a good standard and quality. Table 6.10 summarizes the results.

Table 6.10: Technical support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Somewhat positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses (A)</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Number of responses (B)</td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Learning support from lecturers

An overall analysis of the results reveals that most of the students were receiving enough learning support. However, there were some particularities of the two samples that need to be discussed separately.

Sample A:

Nearly two thirds of the students from sample A were receiving enough learning support. Faculty members received a large number of compliments from the students. The most common terms used by the respondents were: "excellent", "very/extremely responsive (5)", "helpful", "promptly answer questions", "always understanding", "good faculty give good support regardless of medium (...)", "supportive", "very approachable", "available". The number in brackets indicates that five students mentioned the term responsive with different degrees of intensity (e.g. very, extremely). There was no student who was having insufficient learning support and the students who were having it sometimes did not report any major concern.

Sample B:

Nearly half of the students from sample B reported receiving enough learning support, although 20% of the students were negative about the support they received. Again, students from sample B appeared to be more independent learners so they did not require a great deal of learning support. Even so, their comments about the learning support were very positive. Students who were having it sometimes did not report any major concern. One
of the students who reported not receiving enough learning support complained about problems experienced in accessing mentors. Another student reported e-mailing another North American University for support.

Table 6.11: Learning support

<table>
<thead>
<tr>
<th>Responses</th>
<th>Positive</th>
<th>Somewhat positive</th>
<th>Negative</th>
<th>No reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of responses (A)</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Number of responses (B)</td>
<td>9</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Specific recommendations about the usage of the Internet for distance learning

Sample A:

Students' original comments were categorized as follows:

(a) Appropriateness (5): for example, of these five, three were about the suitability of DE via the Internet to students' learning styles, attitudes towards learning, and behaviours. One of the students commented that "people with an interest in the technology, who are not afraid of it, should be encouraged. Those uncomfortable or afraid should think twice". Another example of suitability to the students was expressed by a student who stated that DE via the Internet was "most useful at graduate\textsuperscript{61} level with students who have a high level of discipline and motivation". Yet under this category, there were two examples of students concerned with the issue of the suitability of DE via the Internet to the discipline, course and subject matter taught.

(b) Communication (4): the issue of communication was a concern for four students whose recommendations were about the communication channels when learning at a distance. For example, one of the students pointed out that "interaction remain a key component" to determining the success of a DE programme. Another example was a student who reported that "students and teachers need to check and respond to e-mail/WebBoard often in order to keep the communication flowing (...)". Another comment expressed the importance of "some face-to-face meetings".

(c) Technical support (2): there were two recommendations on the importance of technical support in determining the success of a DE via the Internet programme. For example one of the students recommended having strong technical support and the other student commented that "(...) keep the technical support as it is excellent".

(d) Self-discipline/organization (1): one of the students strongly expressed the importance of self-discipline and organization in order to succeed in learning at a distance via the Internet. She recommended making "a schedule and stick to it, when to study, to work on projects, etc."

Sample B:

Students' recommendations fall into the following categories:

(a) Supplementation (3): there were three students who recommended that DE via the Internet should either be used as a supplement to traditional education or supplemented with personal studies.

(b) Appropriateness (2): there were two students who expressed concern about the suitability of DE via the Internet to the students and to the discipline taught. For example, one of the students pointed out that the DE via the Internet was "a great alternative to traditional methods, especially for working adults". The other student reported that "every course is different, some are more appropriate for Internet than others".

(c) Communication (1): one of the students reported that the faculty should encourage the use of a message board for "e.g. posting FAQs [Frequently Asked Questions], starting discussion threads (...)".

\textsuperscript{61} In North America the term graduate is used to refer to postgraduate level.
(d) Technical support (1): one of the students highlighted the importance of the role technical support plays in the process of learning at a distance via the Internet.

(e) Remote group project (1): one of the students reported that experiments with 'remote' group projects should be tried.

(f) Self-discipline/organization (1): "getting more organized" recommended by one of the students.

(g) Separate (1): one of the students argued that DE techniques should not "be mixed with standard courses".

(h) Model (1): one of the students mentioned another university DE programme as a model to be followed due to its effectiveness and therefore success.

6.5.3 Usability of the Internet for DE

Students' impressions about the Web-based course content

Students assessed course content on five five-point scales. There was a response rate of 92%. Impressions from students of sample A were slightly more positive than the impressions from the students of sample B who were rather less positive although not negative. Table 6.12 below presents a summary of the results.

Table 6.12: Summary of the results regarding the impressions about the Web-based course content by the students

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Topic</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating A</td>
<td>&quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td>4.25</td>
<td>3.88</td>
</tr>
<tr>
<td>Rating C</td>
<td>&quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>4.12</td>
<td>3.41</td>
</tr>
<tr>
<td>Rating B</td>
<td>&quot;frustrating&quot; = 1 to &quot;satisfying&quot; = 5</td>
<td>4.06</td>
<td>3.35</td>
</tr>
<tr>
<td>Rating E</td>
<td>&quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>3.94</td>
<td>4.12</td>
</tr>
<tr>
<td>Rating D</td>
<td>&quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.56</td>
<td>2.71</td>
</tr>
</tbody>
</table>

The most positive outcome was that the students of sample A found that the Web-based course content was quite "wonderful". However, students from sample B, reacted rather differently. For example, the most positive outcome in this case was that the students found that the Web-base course content was quite "flexible". On the other hand students from both samples agreed that the Web-based course content was slightly "difficult" as their mean values were below the neutral value (3.00).
Sample B:

Figure 6.7 below illustrates the distribution of the most positive impression about the Web-based course content by the students of sample B.

**Figure 6.7: Rating E: Rigid to Flexible**

Students from sample B expressed a more positive attitude about the flexibility of the Web-based course content (mean = 4.12). Nearly half of the students (figure 6.7) found that the Web-based course content was "quite flexible" and over one third found it to be "flexible". This finding is another example of flexibility being a crucial aspect for the students of sample B. Figure 6.8 illustrates the distribution of the most negative impression about the Web-based course content by the students of both samples.

**Figure 6.8: Rating D: Difficult to Easy**

The mean values calculated for both samples indicate that students from sample A and from sample B agreed that the Web-based course content was neither "easy" nor "difficult". However, the mean values are slightly below the value 3.00 which indicate a tendency to the rating to be "somewhat difficult", especially by the students from sample A (mean = 2.56).

**Effectiveness of DE via the Internet**

Students were asked to rate the level of effectiveness of DE through the Internet according to the five-point rating scale from "Ineffective" to "Very effective" for five aspects of the learning process (see table 6.13). Charts
were constructed to illustrate the distribution of the students' responses. Most of the results were positive. The least positive outcome from sample A was about the level of effectiveness of DE via the Internet for consultation with tutor. In comparison with the responses given by the students from sample A, students from sample B had a less positive attitude towards the effectiveness of DE via the Internet. While in sample A, there were no negative outcomes, in sample B there was one negative mean value. This refers to group work. Students of sample B rated the level of effectiveness of DE via the Internet for group work slightly negatively. See figures 6.9 and 6.10 respectively.

**a) Effectiveness of DE via the Internet for consultation with tutor**

![Figure 6.9: Consultation with tutor](image)

The level of effectiveness of DE via the Internet for consultation with the tutor was the least positive rating by the students from sample A (mean (A) = 3.29), which is slightly higher than the rating for sample B (mean (B) = 3.00). However neither group fell below a mean of 3.00, therefore the overall outcome was not negative.

**b) Effectiveness of DE via the Internet for group work**

![Figure 6.10: Group work](image)

In contrast to the outcome from the students of sample A (mean = 3.31), students from sample B rated the level of effectiveness of DE via the Internet for group work as being slightly negative, although the mean value (2.71) was close to the neutral value. These students did not find that DE via the Internet for group work to be very effective or ineffective. This provides evidence that students pursuing degrees in the Mathematical Sciences would
have to make use of a highly sophisticated interface that supports co-operative work, sharing the same piece of work (e.g. programming code and mathematical problems) so that more than one person could work together at a distance synchronously. The fact that this kind of tool was not being used by this department could be due to an insufficient demand for group work. Previous studies have shown that male (i.e. the majority of sample B) students' learning styles are characterized by independent learning and less need to work together with fellow classmates (Blum, 1999). On the other hand, the most positive outcome from both samples A and B was regarding the level of effectiveness of DE via the Internet for students' participation. See figure 6.11:

![Bar chart showing students' participation](chart.png)

**Figure 6.11: Students' participation**

The distribution shown in this figure (6.11) clearly illustrates that both mean values from samples A and B were very positive (4.18) and (4.00) respectively. There were some comments by the students that illustrate the rise in students' participation in this DE setting:

"Class discussion can go on all week on the WebBoard. Discussion is richer because it is written down, so more thinking goes into it, and all can participate" (sample A)

"I actually prefer this method of instruction (DE) to the traditional classroom. I find myself interacting much more with my teachers and fellow classmates" (sample A)

"Given the current state of the bandwidth (generally available) the message board is the most effective way of building an on-line community for a course" (sample B)

Other studies (e.g. Harasim, 1987) have also found a rise in student participation with the introduction of DE programmes. One speculation for this rise was that there are students who, for reasons such as intimidation in front of several students (traditional classroom), being shy, or having English as a second and not being very well established language, would feel more comfortable with the written communication. In the Harasim (1987, p.123) study, there were three comments from students who were taking DE courses that illustrate this point:

"As far as communicating in course goes, I can definitely say that I contribute at least 50% more frequently in this course than in regular courses. I definitely feel more comfortable writing rather than speaking to a large new group".

"One-to-one I am a fairly verbal person, but I do not participate well in a class situation and never have. This medium enabled me to participate far more than I would have in a regular class. I have taken other courses with some of the participants in this course. My observation is that those who tend to participate double or triple their contribution on-line. Quieter students catch up to where those active participants were before".

"Overall, I feel very positive about on-line learning: in fact I am taking another on-line course next term. I have been much more of an active participant in this course than in any other course. As other students mentioned, actual hours spent on the course have certainly been greater".

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One of the ways of measuring participation is monitoring communication, either via e-mail messages, telephone calls or messages posted on the WebBoard. Students of the Mathematical Sciences department were encouraged to communicate with their mentors and with other students. The extent to which they communicate does affect their grades as described earlier (section 6.5) in this chapter.

c) Summary of the results

Table 6.13: Summary of the results regarding the effectiveness of DE through the Internet by the students

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Mean (A)</th>
<th>Mean (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students' participation</td>
<td>4.18</td>
<td>4.00</td>
</tr>
<tr>
<td>Lectures</td>
<td>4.06</td>
<td>3.57</td>
</tr>
<tr>
<td>Discussion</td>
<td>3.82</td>
<td>3.00</td>
</tr>
<tr>
<td>Group work</td>
<td>3.31</td>
<td>2.71</td>
</tr>
<tr>
<td>Consultation with tutor</td>
<td>3.29</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Satisfaction with learning via the Internet

Students' level of satisfaction with learning via the Internet was measured by a five-point rating scale from dissatisfaction to satisfaction, as shown in figure 6.12 below:

![Figure 6.12: Students' level of satisfaction with DE via the Internet](image)

The distribution illustrated in figure 6.12 indicates that the overall outcome of the responses from sample A was clearly very positive (mean = 4.56). There was no negative ratings by the students from sample A. Students from sample B rated this positively as well (mean = 3.90). There were only three students whose ratings were rather negative. In order to have a better understanding of the reasons for their ratings, a set of categories is presented. These categories summarize the analysis of the students' explanations.

Sample A:

The factors that led the students of sample A to be satisfied and somewhat satisfied were:

(a) Communication (4): despite being satisfied, four students pointed out that they still miss the personal contact with faculty and classmates. However, they showed satisfaction with communicating at a distance through the Internet. For example, one of the students reported that he/she was able to establish more contact with faculty members, referring to the comparison with the traditional setting as experienced before.
(b) Effective learning (3): there were four students whose reason for being satisfied was that DE via the Internet was an effective way of learning. One student said that the instructors and the technical support were "great" and that there was "plenty of contact with other students". Another student commented that he/she was "enjoying the lectures and learning a lot". A third example is the comment by the student who reported that it was "the best thing" he/she has "done educationally".

(c) Challenge (1): one of the students reported being satisfied although this student pointed out that "group projects are a challenge" thought.

(d) Faculty commitment: one of the students commented that "it has been a great experience. The school does a lot to make us feel connected". This last comment indicates a particularly important determinant of a successful DE programme: faculty members' commitment.

Sample B:

The factors that led the students of sample B to be satisfied were:

(a) Effective learning (3): three students explained that their reasons for being satisfied and somewhat satisfied were completion of the course with a "good grade", being able to graduate "on time" and the fact that "it's done more than" the student "thought it would".

(b) Communication (1): one of the students explained that despite being satisfied, he/she would have liked to use video. According to this student "it's key for feeling you're [the student] part of the group".

(c) Quality of the course and the material (1): one of the students highlighted that the reason for being satisfied with DE via the Internet was the quality of the course and the material: "I really love the course. Calculus in Mathematica is very well written and has a good unifying vision to it".

(d) Independent learning (1): in spite of the self-discipline mentioned by one of the students, to "allocate the necessary time to advance in the course" was rather hard sometimes. Although, this student rated being somewhat satisfied with DE via the Internet.

(e) Expectations met (1): one of the students reported that "every expectation" was met so that he rated being satisfied with DE via the Internet.

The factors that led three students of sample B to be dissatisfied and somewhat dissatisfied were the technical problems (e.g. 'bugs'), reported by one student who was "somewhat dissatisfied" and lack of support, reported by two students. However, these are the views of a minority of the students of sample B so they had very little impact on the overall outcome, which was positive.

6.5.4 Acceptability of DE via the Internet

Students were asked to comment on whether DE via the Internet was a good way of learning. The vast majority of the students responded positively (over 90%).
Sample A:

Respondents from sample A agreed unanimously with the fact that DE via the Internet was a good way of learning. They explained that it was good because of the following reasons:

- High quality of the DE programme (2)
- Improved communication (2)
- Individual needs were met (2)
- Independent learning (2)
- Effective learning (2)
- Access to advanced degree (1)
- Convenience (1)
- IT skills developed (1)

Sample B:

The vast majority of the students from sample B (84.2%) agreed with DE via the Internet being a good way of learning. Their reasons for agreeing with it were:

- High quality of the DE programme and the material used (7)
- Effective learning (2)
- Flexibility (1)
- Independent learning (1)

The numbers in brackets indicate the frequency with which these aspects were mentioned by the students. The most important reason for the students of sample B agreeing with the fact that DE via the Internet was a good way of learning was the high quality of the DE programme and the material used for the course. However, this reason was mentioned equally, with a variety of other reasons as listed above, by the students of sample A.

Students' preferences (traditional education or DE)

Most of the students from sample A (56%) reported that they would have preferred traditional education if they had been offered the choice. However, nearly half of the students from sample B (47.5%) preferred DE to traditional education (42%). Nineteen percent of the students from sample A and 10.5% of the students from sample B would have preferred a combination of both. See table 6.14.

Table 6.14: Students' preferences - Samples A and B

<table>
<thead>
<tr>
<th>Mode of Education</th>
<th>Sample A</th>
<th>Sample B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Education</td>
<td>56%</td>
<td>42%</td>
</tr>
<tr>
<td>Distance Education</td>
<td>25%</td>
<td>47%</td>
</tr>
<tr>
<td>A combination of both (TE and DE)</td>
<td>19%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

Sample A:

Students from sample A reported that they would have preferred traditional education for the following reasons:

- Human contact (3)
- Time lag found in the DE technologies (2)
- Access to a good library on campus (1)
- Uncomfortable with DE (1)
Their reasons for preferring DE were:

- No need for travelling (2)
- Flexibility (2)
- Convenience (1)
- Sense of an on-line community (1)

One of the students whose preference was a combination of both, explained that he/she enjoys the flexibility provided by DE but would like to benefit from access to a good library on campus. Another student stated that he/she would prefer both if distance to the University campus allowed.

**Sample B:**

Students from sample B would have preferred traditional education because of the following:

- Better explanation of certain details when lecturer is teaching in person (3)
- There are fewer 'bugs' in traditional education since there is less or little use of the DE technologies (1)
- Social aspects (1)
- Not totally comfortable with DE yet (1)

The students whose preference was DE gave the following reasons:

- Self-paced learning (1)
- Independent learning (1)
- Hard copy material "for later references and study" is also available when not using the computer (1)

The distribution of the percentages for both samples is shown by figure 6.13.

![Students' preferences](image)

**Figure 6.13: Students' preferences**

There are important differences between the preferences of the students from the two samples. For example, the most important aspect that encouraged students from sample A to prefer the traditional way of learning was the human contact with their lecturers and classmates. However, students from sample B were more concerned with the ability to understand explanations of mathematical problems at a distance, and they would have preferred the traditional way of learning, where the lecturers would be able to explain these issues in a more detailed way making it easier for the students to assimilate. However, as this was not a major concern, a significant number of students from sample B preferred DE.
The way students see DE

The answers of the respondents were distributed among the four options given to the lecturers (see section 6.4.4 of this chapter).

Sample A:

The majority of the students (nearly 80%) from sample A saw DE as being an alternative to traditional education. Nearly 12% saw it as being an attempt to simulate traditional education. No one chose the option "substitute" and nearly 12% completed with the following:

- It is "the same as traditional education, just a different format"
- It is a "scheduling option"

Sample B:

Nearly 70% of the students from sample B saw DE as being an alternative to traditional education. Two students (10.5%) saw it as being a substitute for traditional education and only one saw it as being an attempt to simulate traditional education. Three students out of 19 added the following views:

- "Bad replacement, good supplement"
- "A complement to traditional education"
- "A supplement and a complement to traditional education"

These results indicate that students studying different subject matters due to their different courses saw DE similarly, as there was no significant differences in views across both samples.

Meeting students' expectations

To further the investigation of the students' level of acceptance of DE via the Internet, students were asked to report on whether or not their expectations had been met.

Sample A:

There was a response rate of 94% of the students of sample A surveyed. The overall outcome was very positive, only one student was not certain about it. These categories below summarize the students' reasons for having their expectations met:

- Getting a degree (2)
- Flexibility (2)
- Access to the highest quality courses (2)
- Development of IT skills (2)
- Excellent technical support (1)
- Faculty commitment (1)
- Effective learning (1)

Sample B:

There was a response rate of 100%. The majority of the students of sample B had had their expectations met (84.2%). Only three students reported not having their expectations met. Students who had their expectations met explained their reasons as being:

- Effective learning (5)
- Completion of the course and degree (2)
- Demands of job were supported (1)
On the other hand, students whose expectations were not met explained that:

- Not sure about the level of learning (1)
- Did not learn what was expected (1)
- Too difficult (1)

However, the overall outcome was very positive as the majority of the students reported having had their expectations met.

Students would take a distance learning course via the Internet again

Sample A:

Students from sample A unanimously reported that they would continue taking courses at a distance by the Internet. The reasons for this were based on their very positive experience of the course they were taking during this survey (summer of 1999). One of the students argued that he/she prefers "this method of instruction to the traditional classroom" because he/she finds himself/herself "interacting much more with teachers and fellow classmates". Other interesting comments were: "Oh yes. I'm an advocate of distance education. Particularly for classes that don't require extensive hands-on activities. My experience is very positive"; and "It's the only way for me to get my degree without having to move a long distance and give up my current job. But still, I love this form of learning".

Sample B:

Nearly 85% of the students from sample B would take another distance learning course via the Internet. There were only three students out of 19 who reported that they would rather not take another distance learning via the Internet. There was a response rate of 100%.

Similarly to the reasons given by the students from sample A, students from sample B reported that their reasons for taking another course at a distance through the Internet were based on their very positive experience with the course they were taking during this survey (summer of 1999). One of the students highlighted the convenience provided by this way of learning: "I want the convenience of taking the course at my own pace and on my own time". Another interesting comment worth discussing indicates the need, for an adult working student, to remain involved with further education: "It's a great way to stay involved in the educational process".

Students' further comments or issues

The response rate for the final question: "Do you have any further comments or issues that should be addressed for the next distance learning course?" was lower than for the rest of the questionnaire. However, their comments provided some interesting aspects that they felt needed highlighting.

Sample A:

Nearly half of the students from sample A responded to this question. These students complimented the faculty members a great deal. They were satisfied with the course, with the lecturers, and with the course content in particular. There were eight comments that fall into the following categories:

(a) Faculty commitment (3): three students out of eight complimented the faculty. For example, one of these students thanked the faculty, the staff and fellow students for making the course at a distance via the Internet a community. Another example under this category was a comment in which the student also complimented his lecturers: "my two current professors are very skilled at using the technology as a tool to successfully deliver content. I have had two others who were less successful in managing the technology in a meaningful way".

(b) Planning (2): there were two students whose comments were about the issue of planning a DE course delivered by the Internet. For example, one of these students highlighted that "professors need to plan out lectures very carefully. Those that do, and keep track of time, are very effective in this medium (...)". Another example that falls under the category was about group projects: "plan group projects carefully. Wherever possible schedule them so that the student is able to meet with his/her group at least once, face-to-face, while on campus".
(c) Availability (2): there were two comments that fall into this category. They were about the availability of the lecturer and the availability of the course content. The student who was concerned with the availability of the lecturer reported that lecturers with regular office hours should be ensured. The other student who was concerned with the availability of the course content reported that the texts required should be available nationwide.

(d) Isolation (1): there was one student who argued that the issue of the student's isolation should be addressed.

Sample B:

Students from sample B were concerned with three aspects: appropriateness, communication and effectiveness of DE by the Internet. There was a response rate of over one third of the students. The student who was concerned with the communicational aspects of DE through the Internet reported that the message board was the most effective way of building an on-line community given the current state of bandwidth. There were two students concerned with the appropriateness of DE through the Internet. They were particularly concerned with the suitability of the course to students. For example, one of these students commented that: "future refinements: adapt style and content to the needs and learning style of the individual (student, adult student, traditional campus student), (...)". Another interesting comment about the appropriateness was: "be a little more understanding of the fact that not everyone is a computer scientist (...)". The student who was satisfied with the effectiveness of DE by the Internet commented that: "(...) I'm quite pleased with the entire programme. I have done well in the two calculus courses I have taken via DE, and believe it to be far superior to traditional education".

6.6 Discussion of overall results

The data analysis of lecturers and students' responses to DE via the Internet reveals some interesting findings about the issues they face when they are teaching and learning at a distance through the Internet. It also reveals the factors that affect the effectiveness of DE via the Internet on the teaching and learning processes. This section discusses the implications of these findings pertaining to the aims stated in section 6.3.1 of this chapter. The results from the data analysis reveal that, on average, the DE programme at this University was successful. The technology used was effective and students were satisfied with learning at a distance via the Internet. However, minor issues were detected from individual comments but these did not interfere a great deal with the overall outcome as they came from a small number of respondents. Nevertheless, it is worth discussing them so that they can provide an insight into decision and policy making for future DE programmes.

6.6.1 Limitations of the current technology

One of the outcomes revealed by the data analysis was the frustration of some lecturers and students regarding the technical limitations of the current technology for DE. There appears to be a rather different attitude of the North Americans towards technology. This can be explained by the socio-economic factors that enable North American institutions, especially this University, to purchase the latest technologies so that they can be used as a trial in DE courses. This privilege was not found in Northern Ireland or in the UK. Thus, the availability of resources and infrastructure as well as the latest technologies provided an advantage that contributed to the success of this programme. However, this technologically driven culture promotes high expectations of what can be achieved with the current technological developments by lecturers and students, therefore, their ambitions were ahead of the capabilities of the current technology. As a result, the quality of audio and video remains an unresolved issue in DE settings. The current state of the bandwidth and thus the speed of connections were also a cause of frustration. More specific though was the issue of Web interfaces capable of supporting mathematical symbols, as argued by the director of the DE programme of the department of Mathematical Sciences. Moreover, there appears to be a demand for further exploration of tools that support collaborative work in shared interfaces between students and lecturers, and among the students themselves, by the Mathematical Sciences department. This group rated the level of effectiveness of DE through the Internet for group work slightly negatively (section 6.5.3). Such a system would have to enable sharing documents, including programming codes that involve mathematical equations. Furthermore, the issues mentioned by some students about the difficulties in specifying details of programming codes through the telephone or e-mail would be solved. However, these issues are likely to disappear as the technology evolves.
6.6.2 Implications for faculty

The cost-benefit ratio of DE was found to be a concern by one of the lecturers. In his view there is a trade-off. DE via the Internet increases enrolment (Hiltz, 1997) and allows for reaching a wider audience of learners, but it also increases workload for the lecturers, at least initially (Hiltz, 1997). Furthermore, there was another lecturer who pointed out the fact that she would like it to be acknowledged that DE via the Internet demands more work than in traditional settings, and therefore it should be compensated accordingly. This raises the issue of how to encourage lecturers to teach at a distance via the Internet, a discussion that has been going on for nearly a decade. Incentives are amongst the solutions (Rockwell, 1999). However, there are implications for the faculty members such as time required (especially taken from research), training requirements, and developing effective IT skills. Typically, faculty members do not want to change to a method that requires more work and has outcomes that are not significantly better than in traditional settings that are more familiar to them (Bourne et al., 1997). It cannot be expected that lecturers will feel comfortable with the technology (when new tools are implemented), use it effectively, and maintain it as well, without providing them with extra training and time to prepare the on-line classes (Sherry, 1995). Additional motivation could include a reduced teaching load during the semester that a course is being re-designed for DE delivery, and clear policies that reward such efforts and innovation when promotion and tenure decisions are made (Hiltz, 1997).

Bets (1998) found that lecturers would like support for DE course development (e.g. financial, administrative, and technical supports) as well as release time for training. However, the overall time spent on learning to operate the technology was not a major issue for the lecturers of this University as seen earlier. Moreover, in a small scale survey with Deans, Bets also found that Deans would motivate the lecturers, in their departments, to participate in DE by: "(1) monetary support for participation e.g. stipend, overload; (2) personal motivation to use technology; (3) increase in salary; (4) credit towards tenure and promotion; and (5) release time". Arvan (1997, p 26) argues that "the greater the extent of the instructor mediation, the more costly it is to assure institutional commitment to quality". This raise a point that the lecturer plays a crucial role in DE and while such a role can be partially automated, the most essential teaching tasks cannot be replaced by even the most sophisticated technologies. Finally, the implementation of future DE programmes needs to address not only the incentives and barriers to the lecturers, but also the appropriate technology to support it effectively.

6.6.3 Modes of interaction and communication

One of the most critical issues in communicating, and hence interacting at a distance, is the lack of non-verbal cues. These visual signs are crucial to the teaching and learning processes in that they can provide an indication about whether the student(s) is(are) interested, bored, irritated, excited or tired. Some lecturers have argued that they miss such visual cues, unless they were interacting through videoconferencing. However, even in videoconferencing classes, this issue remains (chapter 5) due to the poor quality of current video technologies for DE. Other factors, reported by the lecturers, that affected the effectiveness of communication were time lag, lack of interaction, limitations of the communicational channel, and slower pace discussion through RealAudio (table 6.2, section 6.4.2). One of the students would have liked to use video because it is believed that it would enhance the sense of being part of a virtual community. Besides that, some of the students reported that they would have benefited from having face-to-face meetings. These students missed the personal contact with lecturers and classmates. While a substantial proportion of remote students can make new friends via the written mode of communication, this obviously makes close personal friendships more difficult (Hiltz, 1997). This aspect raises a discussion about the lack of socialization and the isolation of the remote student.

6.6.4 Isolation

Although isolation and lack of socialization were not considered to be problematic amongst the students from both samples (section 6.5.2), there was one student who argued that it should be addressed. Whereas most of the students in a traditional setting develop new friendships in class, only a third of the remote students report doing so (Hiltz, 1997). Isolation has two dimensions: (1) physiological (distance in place, being alone) and (2) psychological (distance in thoughts, feeling alone). The basic problem of DE is the psychological dimension as a result of the physiological one. Previous studies have indicated that isolation and its emotional consequences affect motivation, consequently students drop out. Furthermore, research has shown that socializing experiences increase retention. "Chat rooms and threaded discussions can restore some 'classroom atmosphere' and some peer-to-peer interaction. Students who socialize with their peers are less likely to drop out and more likely to maintain high levels of motivation" (Maner, 1998). Thus, knowing that the drop out rates are typically higher in DE than in traditional
settings (Hiltz, 1988; Hiltz, 1994; and Hiltz, 1997), isolation is amongst the issues that the faculty needs to consider when implementing future DE programmes.

After having concluded the data analysis, it was possible: (1) to identify the general issues that affect the effectiveness of DE by the Internet and therefore the specific factors that affect the lecturers' teaching process and the students' learning process; and (2) to further the understanding of how each technology fits into the teaching and learning processes, and the extent to which DE, through multiple technologies delivered by the Internet, is effective. A conceptual framework is presented as an attempt to model the dynamics between the causes of these issues and their effects on stakeholders (figure 6.14).
EDUCATIONAL INSTITUTION
Roles and responsibilities
Dept. of Library and Information Sciences:
Management Organization Administrative and Technical support
Dept. of Mathematical Sciences:
Management Organization Administrative and Technical support

TEACHING PROCESS
Roles and responsibilities
Lecturers:
Plan lectures Organize material Develop on-line material Plan synchronous discussions Provide feedback Assess students work
Mentors:
Manage on-line delivery Monitor students' progress Provide technical and academic support Lecturers:
Develop on-line material (Calculus module) Tech. and academic support

MULTIPLE TECHNOLOGIES
Asynchronous:
E-mail WebBoard
Synchronous:
Chat Telephone RealAudio

ON-LINE MATERIAL
Provider
Dept. of Mathematical Sciences:
Development of on-line material (Mathematica) Students' assessment feedback Design → Development → Evaluation

LEARNING PROCESS
Problems faced
Asynchronous:
Lecturers not always responsive Impersonal Requires time for feedback Lack of privacy Synchronous:
Lack of privacy Time lag Limiting for maths and programming codes

STUDENTS' OUTCOMES
Extremely successful
Students receive more support enhanced by the wide range of Internet technologies
Successful
Support to students has two layers: Firstly provided by mentors, secondly by lecturers. There are fewer options for contacting lecturers and no appropriate technology for maths, particularly for group work.

Figure 6.14: Conceptual framework of DE via multiple technologies delivery
6.7 Conclusion and recommendations

In this section possible relationships between the following three groups of factors are discussed: (1) course content and subject matter taught; (2) student learning styles, behaviours, needs and gender; and (3) the effectiveness of DE via the Internet. The results shown in table 6.15 support the evidence that DE through multiple technologies delivered by the Internet was effective from the viewpoints of both, the lecturers and students, since all the outcomes were above the neutral value (3.00).

Table 6.15: A comparison between the effectiveness of DE through the Internet by lecturers and students

<table>
<thead>
<tr>
<th>Aspects of the educational process</th>
<th>Lecturers Mean</th>
<th>Students Mean (A,B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3.50</td>
<td>3.815</td>
</tr>
<tr>
<td>Discussion</td>
<td>3.54</td>
<td>3.410</td>
</tr>
<tr>
<td>Group work</td>
<td>3.70</td>
<td>3.010</td>
</tr>
<tr>
<td>Students' participation</td>
<td>3.71</td>
<td>4.090</td>
</tr>
<tr>
<td>Consultation</td>
<td>3.73</td>
<td>3.145</td>
</tr>
</tbody>
</table>

Overall students rated the level of effectiveness of their participation during the on-line activities for the course very positively. This raises the point that some students actually participate more at a distance. They feel more comfortable communicating by e-mail and WebBoard because they may be shy or intimidated to speak out during traditional face-to-face classes. During the interview with one of the lecturers, he pointed out that this is particularly true for students for whom English is not their first language and therefore, written communication appears to be an advantage over the spoken one. Nevertheless, further formal research is necessary to support this point since there are undoubtedly other reasons as well for the rise in students' participation in this DE setting. The portion of students surveyed for whom English was the first language was much higher than the ones whose first language was not English. However, there appears to be a relationship between the rise in students' participation in DE and the increase in the options available to interact with lecturers and in the features enabled by the current technology used by this University. Another speculative argument could be the level of and the acknowledgement by the lecturers of their commitment to quality, since this University is known to be one of the leaders in Asynchronous Learning Network (ALN).

On the other hand, for activities that involve students working together such as group work, students' ratings were not as positive as the ratings for the other aspects of the learning process, as shown in table 6.13 (section 6.5.3). Nevertheless, the ratings given by the students of sample B pertaining to the level of effectiveness was the only negative outcome (2.71) (see table 6.13, section 6.5.3). This suggests the idea that the subject matter taught and gender were both contributory factors that affected the effectiveness for group work activities. However, it was found that the technology limitation was the biggest barrier to the students of sample B performing group work activities effectively.

6.7.1 Subject matter and gender

It was determined that the greatest differences between samples A and B were due to the nature of the subject matter being taught (sample A, in Library and Information Sciences and sample B, in Mathematical Sciences); as well as their gender (sample A, female students and sample B, male students). Previous studies in gender differences in attitudes towards the use of computer technologies in particular, and in DE in general, have determined that they do affect students' learning styles, behaviours and needs (e.g. Barret & Lally, 1999; Yates, 1993; Blum, 1999; and Huber & Schofield, 1998). Moreover, it was found that the fact that the students of Mathematical Sciences were dealing with programming code (which involved extensive use of mathematical symbols and equations) would have a significant impact on their needs which differ a great deal from the ones of the Library and Information Science students. This could be another indication that subject matter does affect student needs.
6.7.2 Gender differences and technical support needed

It was expected that the male students would report higher rates of satisfaction with technical support received. However, the data analysis indicated that, students from sample A (female) unanimously reported receiving enough technical support, and a lower proportion (60%) of the students from sample B (male) reported receiving sufficient support.

Despite the evidence that gender does have an impact on the degree of technical support needed as seen earlier, it does not mean that the male students would need less technical support than the females ones, because there are other factors that could have an affect on it. Female students normally need more technical support than the male students do and, in this instance, they were being successfully well provided with high quality technical support, this is an indication that the staff members of the department of Library and Information Sciences were extremely successful in their commitment to quality. Commitment to quality is one of the most critical aspects of an effective DE course. However, since the overall outcome about the degree of technical support received by the male students of the department of Mathematical Sciences was positive and the fact that male students normally require less technical support, it was concluded that the other factors affecting this outcome were the differences in terms of students’ needs, learning styles, and methods of instruction between these two departments.

6.7.3 General recommendations

This section summarizes the recommendations that arose from this evaluation, which are divided into two groups. The first group of recommendations pertains to the faculty commitment, which was found to be a determining factor in the success of the DE programme in this North American University setting. The second group of recommendations is about the appropriateness of DE in relation to students, technology, and material. These may be particularly helpful to decision and policy making for future successful DE programmes.

a) Faculty commitment

- Communication/responsive feedback:
  - provide sufficient face-to-face meetings
  - make an effort to respond to every e-mail and WebBoard message
  - make more effort to involve remote students in discussions, real time and asynchronously
  - ensure students engagement with the course
  - organize structured on-line discussions

- Availability:
  - of the lecturer: be available to students for one-to-one tutorials
  - of the material: whenever possible, make on-line versions of full articles available on the Web page of the programme
  - of the technology: make sure students have access to appropriate tools

- Technical and learning supports:
  - provide social and technical support in addition to academic support
  - encourage group work activities

- To keep up with the technological developments/Update technology:
  - look for effective audio chat tools
  - ensure appropriate set-up prior to each class
  - look for effective tools that support synchronous collaborative work with sharing interfaces
b) Appropriateness

- Suitability of the course to students (considering age, gender, subject matter)

- Suitability of the technology to the teaching/learning activities
  - For example: use of tools that support synchronous collaborative work with sharing interfaces for group work activities

- Suitability of the material, course content and teaching styles to students' individual learning styles and needs.
  - For example: provide hard copy material to students so that they can read it when not using the computer
Chapter 7

Towards the Development of a Conceptual Model for Effective Delivery of Distance Education

7.1 Chapter outline

The three previous chapters have provided case studies carried out in three different settings, the impact diverse technologies have upon the main stakeholders (i.e. lecturers and students), and the issues surrounding them when teaching and learning at a distance. The present chapter is concerned with a cross-case study analysis aimed at identifying common issues across the case studies, A, B and C. Following this, conceptual models are built to explain the results. Thus, the ultimate aim of this chapter is to report a range of conceptual models and frameworks of planning DE. Figure 7.1 illustrates an overview of the thesis structure in which the shaded box represents chapter 7 in relation to the overall thesis structure. As such, this chapter is structured as follows: section 2 introduces the chapter; section 3 outlines the objectives; section 4 describes the methods used for carrying out the work reported in this chapter; section 5 provides analysis and discussion of the results from the cross-case study investigation; section 6 is concerned with outlining the development of socio-technical conceptual models of existing DE delivery derived from case studies A, B and C; section 7 outlines the development of a range of conceptual frameworks and models for the planning of effective DE programmes; and finally, section 8 concludes this chapter with a brief summary.

![Figure 7.1: Chapter 7 in relation to overall thesis structure](image)

7.2 Introduction

In this chapter, the development of a conceptual model for the effectiveness of DE is reported. The development of this conceptual model is based not only on the previous conceptual frameworks presented at the end of chapters 4, 5, and 6 but also on a cross-case study analysis. Research on the effect of DE has been focused on student outcomes (Ahern & Repman, 1994) but not on the reasons for such outcomes. Most research in DE has been confined to a single institution (e.g. Mason, 1989; Miller, 1997; and Tong, 1998) and often to an individual course. There has, therefore, been limited potential for developing generalizable theory and for building generic models (Kember, 1995; p.57). A single conceptual model of effectiveness in DE seeks to pull together the many diverse elements surrounding the field of DE. Although the focus of this work is upon DE settings, the frameworks and
models hold the potential to further the understanding of the implications DE technologies have for stakeholders and the relationships between social and technical systems of DE.

A total of 125 individuals were surveyed on an individual basis (table 7.1). Due to the large number of individuals surveyed, it was possible to use quantitative data from the surveys. However, each case study is analysed individually because of the different contexts and thus environmental factors. As a result, qualitative data were extremely useful for the understanding of each case study and for the comparative cross-case study analysis.

Table 7.1: Number of individuals surveyed in each case study

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Case study A (Chapter 4)</th>
<th>Case study B (Chapter 5)</th>
<th>Case study C (Chapter 6)</th>
<th>Case study D (Chapter 8)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>7</td>
<td>36</td>
<td>36</td>
<td>0</td>
<td>79</td>
</tr>
<tr>
<td>Lecturers</td>
<td>3</td>
<td>9</td>
<td>23</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>Managers</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Technicians</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

This chapter is concerned with the cross-case study analysis of the three case studies carried out: A, B, and C. The shaded columns highlight the number of individuals surveyed so far and the total number of individuals surveyed.

7.3 Objectives

The aim of this chapter is firstly, to discuss the reasons for differences across case studies and secondly, to present the development of a conceptual model based on the cross-case study analysis. As such, in this chapter, a further analysis of contrasts is presented followed by a first attempt to formalize the crucial factors that need careful consideration when planning effective DE programmes. This attempt is presented in a range of diagrams that illustrate conceptual frameworks and models for the planning of DE through network technologies.

7.4 Methods

The development of the conceptual model of effectiveness in DE is a natural evolution of the fieldwork carried out and reported in the three different case studies. Building a theory of effectiveness in DE requires further analysis of contrasts by cross-case study tabulation of quantitative data that is complemented, explained and confirmed by the qualitative data. This multiple comparison is argued for by Glaser and Strauss (1967) and by Yin (1994). The ability to perform cross-site or cross-course analysis is seen as particularly important in a DE context (Kember, 1995; p.57). The theory building process also requires the development of frameworks of success and failure for each case study in order to provide a causal structure that represents the strengths and weaknesses in the DE programme of each case study. By identifying the reasons for differences in outcomes across the three case studies and building conceptual frameworks of failure and success for each case study, it is possible to present and discuss a tentative range of conceptual frameworks and models for planning effective DE through network technologies (the planning aid tool).

7.5 Results

This section outlines the results from the cross-case study analysis. The quantitative data obtained from the three case studies were tabulated (tables 7.2-7.10) so that the contrasts can be easily identified.
7.5.1 Satisfaction

Table 7.2: Quantitative data on satisfaction

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No data</td>
<td>(n= 9)</td>
<td>(n= 23)</td>
<td>(n= 16)</td>
<td>(n= 32)</td>
</tr>
<tr>
<td>(+) Positive response</td>
<td>55.56% (+)</td>
<td>65.56% (+)</td>
<td>69.56% (+)</td>
<td>65.62% (+)</td>
</tr>
<tr>
<td>(-) Negative response</td>
<td>N= 32</td>
<td>N= 78</td>
<td>N= 36</td>
<td>N= 78</td>
</tr>
<tr>
<td>Neutral</td>
<td>11.11% (-)</td>
<td>22% N</td>
<td>40% (-)</td>
<td>15.79% (-)</td>
</tr>
<tr>
<td>A = Sample A</td>
<td>61.53% (+)</td>
<td>13.97% (-)</td>
<td>85.71% (+)</td>
<td>88.57% (+)</td>
</tr>
<tr>
<td>B = Sample B</td>
<td>24.5% N</td>
<td>40% N</td>
<td>65% (+)</td>
<td>78.95% (+)</td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Despite all the problems faced by lecturers and students reported previously, in chapters 4, 5, and 6, the overall percentage of satisfaction calculated for lecturers was nearly two-thirds for N=32 and slightly over three-quarters for students, N=78. Students from case study B reported the lowest rates of satisfaction among the students from the case studies. Slightly over 60% were satisfied or somewhat satisfied with DE via videoconferencing. This result was affected by the low rate of satisfaction given by the students who were frustrated by the fact that they had been unaware that the course they had enrolled on was at a distance via videoconferencing. For example, the feeling of frustration is illustrated by the comments of the students who were either dissatisfied or somewhat dissatisfied with DE via videoconferencing. Their comments included:

"At the time of applying for the course. I didn't know there would be videoconferencing"
"It was compulsory part of the course and it was unexpected"
"Unaware it involved videoconferencing"
"Unaware videoconferencing was part of the course"
"I didn't know this module was via videoconferencing"
"I did not know the course was via videoconferencing prior to attending class (…)"

In case study A, the nearly 15% for dissatisfaction or somewhat dissatisfaction could be misleading because of the small sample size (n=7). As a consequence, only one student reported not being satisfied, and this was due to this particular student being a beginner who was experiencing some difficulties with operating the CBM. This student reported also being frustrated as a result of the difficulties experienced: "I started off with no knowledge whatsoever of IT: I didn't know any of the terminology. I've found it extremely difficult to master the easiest of tasks". The majority (around 86%) of the students from case study A were either satisfied or somewhat satisfied with the online IT training. Students from case study C reported the highest rates of satisfaction with DE, nearly 90% were either satisfied or somewhat satisfied with learning at a distance. There were nearly 16% students who were either dissatisfied or somewhat dissatisfied with DE in sample B of case study C (n=19). This was due to 'bugs' in the CBM as reported by one of the students, the high level of difficulty and not enough help, as reported by another student. However, the overall high percentage of satisfaction by the students (three-quarters, N=78), particularly the students from case study A (86%, n=7) and students from sample A of case study C (100%, n=16) suggests that mature working students are more tolerant of minor issues because they are offered the opportunity to maintain their employability by updating their knowledge and skills.

As far as the lecturers were concerned, the overall percentage of dissatisfaction with DE was 12.5% (N=32). In case study B, the percentage of dissatisfaction was around 11%. This was mainly due to the technical limitations of the video and audio channels of communication, as one of the lecturers reported: "Lack of dialogue due to fuzzy pictures and poor sound quality". Another factor that led to dissatisfaction was the suitability of the DE mode of delivery to the subject matter taught by this particular lecturer. This lecturer reported that: "Videoconferencing is particularly inappropriate for the material I teach, syntactic analysis (…). The very static nature of the videoconferencing makes it impossible to use the on the spot, chalk and talk, techniques that work very well in traditional classroom teaching. It is much harder also to have the students being active in class when you can't go round the class and give them individual attention". In case study C, the percentage of dissatisfaction by the lecturers was slightly higher, 13% (n=23). For example, one of the lecturers reported that: "(...) My impression is that students
could not get a correct take on what I was saying". Another example of a comment from one of the lecturers who was dissatisfied was: "I am just not satisfied with the level of instruction. I don't think that it challenges the students enough as a Master degree should".

7.5.2 Preferences

Table 7.3: Quantitative data on preferences

<table>
<thead>
<tr>
<th>Preferences variables</th>
<th>Case Study A (n=3)</th>
<th>Case Study B (n=9)</th>
<th>Case Study C (n=22)</th>
<th>Overall (N=34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.00% TE</td>
<td>55.56% TE</td>
<td>54.54% TE</td>
<td>50.00% TE</td>
</tr>
<tr>
<td>100% DE</td>
<td>22.22% DE</td>
<td>27.27% DE</td>
<td>18.19% Both</td>
<td>32.35% DE</td>
</tr>
<tr>
<td>0</td>
<td>22.22% Both</td>
<td></td>
<td></td>
<td>17.65% Both</td>
</tr>
<tr>
<td>DE = Distance Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57.14% TE</td>
<td>67.66% DE</td>
<td>56% TE</td>
<td>58.59% TE</td>
<td></td>
</tr>
<tr>
<td>42.86% DE</td>
<td>14.28% DE</td>
<td>42% TE</td>
<td>58.59% TE</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>17.86% Both</td>
<td>25% DE</td>
<td>26.70% DE</td>
<td></td>
</tr>
<tr>
<td>Both = A combination of DE and TE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (n=33)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.7% TE</td>
<td>12.12% DE</td>
<td>48.4% TE</td>
<td>58.59% TE</td>
<td></td>
</tr>
<tr>
<td>42.86% DE</td>
<td>14.39% Both</td>
<td>37.21% DE</td>
<td>26.70% DE</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>18.18% Both</td>
<td>14.39% Both</td>
<td>14.71% Both</td>
<td></td>
</tr>
</tbody>
</table>

Despite the relatively high level of acceptability of DE for teaching and learning reported by the lecturers and students, a significant number of lecturers and students would have preferred traditional ways of teaching and learning if they were offered such choice. However, choice is not always an option. On the contrary, lecturers are being encouraged to teach at a distance because educational institutions are being pressurized to do so by government and funding agencies as well as by the increasingly competitive market. Students are also being pressurized to finish their studies in a minimum period of time, to accommodate the increasing job, family and social commitments with a more flexible learning programme. Moreover, particularly for the adult working students, this pressure may come from their bosses who demand they update their knowledge and skills or even pursue higher degrees to maintain their employability or to seek job promotion.

On average, 50% of the lecturers would have preferred to teach by traditional means because they are already accustomed to and familiar with this mode of delivery. In addition, this would not affect their roles or increase their workloads. However, all the tutors from case study A reported preferring DE. This attitude could have been influenced by a number of factors. For example, they were hired to teach solely for the on-line programme of the College. This means that if they had chosen to teach traditionally they would have been teaching for the traditional programme of the College. Another factor may have been that the subject matter being taught by these tutors seems to lend itself well to this mode of instruction. Here they did not take the entire responsibility for the students' learning because this was split between the students themselves and the CBM. As such, the tutors' role was to fill the gap between the weaknesses of the CBM and the very beginner students by offering them face-to-face support and preparing handouts and 'help sheets'. If these tutors preferred to teach IT traditionally, they would possibly have had to take more responsibility for the students' learning. Taking more responsibility is not usually an attractive option. Furthermore, nearly 18% of the lecturers revealed that they would have preferred the dual mode of delivery, combining the advantages and benefits of the technology for DE with the advantages and benefits of the personal interaction in traditional education settings.

Overall, the students' attitudes towards their preferences were not so different, however the percentage of students from sample B of case study B who would have preferred to have been taught traditionally was quite high (80%, n=5). This outcome affected the overall outcome of the students from case study B so the majority would have preferred traditional education (over two-thirds, n=33). There are a number of reasons for this finding. Firstly, some of the students were unaware that they were enrolling in a class delivered by videoconferencing which then caused frustrations. Secondly, the very static nature of videoconferencing makes the learning process rather uncomfortable as reported by a few students.

"I get bored easily - watching a screen (…)
"I don't really like talking to a TV screen (…)
"The videoconferencing is hard work as many class members are reluctant to talk (…)
"(…) it is very intimidating (…)
"It takes a while to get used to!"
Sometimes the equipment doesn't work effectively
"Very impersonal"
"Sometimes system fails"
"(...) the link is switched off automatically"
"Small technical breakdown sometimes"
"Not very personal, limited to certain times only"
"Occasional technical hitches. Being cut off in mid sentence at the end of the class. Very formal atmosphere"

Thirdly, time lag in the synchronous mode of delivery also caused frustrations and efficiency loss, particularly when there were breakdowns in the communication channel.

"Breakdown of communication"
"Simple problems are harder to understand due to communication breakdowns!"
"Occasional crashes"
"Not very effective, would need twice as long to cover the same amount of the course"
"(...) TV screens are never the same as personal contact. Explanations take much longer and communication is not always easy"

7.5.3 Expectations met

Table 7.4: Quantitative data on expectations

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectations met</td>
<td>(n=3)</td>
<td>(n=9)</td>
<td>(n=23)</td>
<td>N= 35</td>
</tr>
<tr>
<td>Instructors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% (+)</td>
<td>100% (+)</td>
<td>100% (+)</td>
<td>100% (+)</td>
<td>100% (+)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11.11% (-)</td>
<td>11.11% (-)</td>
<td>11.11% (-)</td>
<td>11.11% (-)</td>
<td>11.11% (-)</td>
</tr>
<tr>
<td>Key:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(+) = Positive response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-) = Negative response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP = Somewhat positive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (n=27)</td>
<td>A (n=5)</td>
<td>A (n=15)</td>
<td>A (n=31)</td>
<td></td>
</tr>
<tr>
<td>70.37% (+)</td>
<td>70.37% (+)</td>
<td>70.37% (+)</td>
<td>70.97% (+)</td>
<td></td>
</tr>
<tr>
<td>29.73% (-)</td>
<td>29.73% (-)</td>
<td>29.73% (-)</td>
<td>29.12% (-)</td>
<td></td>
</tr>
<tr>
<td>B (n=4)</td>
<td>B (n=4)</td>
<td>B (n=19)</td>
<td>B (n=34)</td>
<td></td>
</tr>
<tr>
<td>75% (+)</td>
<td>75% (+)</td>
<td>75% (+)</td>
<td>75% (+)</td>
<td></td>
</tr>
<tr>
<td>25% (-)</td>
<td>25% (-)</td>
<td>25% (-)</td>
<td>25% (-)</td>
<td></td>
</tr>
<tr>
<td>100% (+)</td>
<td>100% (+)</td>
<td>100% (+)</td>
<td>91.18% (+)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8.82% (-)</td>
<td></td>
</tr>
</tbody>
</table>

The overall percentage of lecturers and students whose expectations of the DE course were met was also high. About three-quarters of the lecturers and the same number of students reported having their expectations met. The most significant difference was, however, between the percentages of the students whose expectations were not met across the three case studies. For example, 60% of the students from case study A reported not having their expectations met. This high negative score was due to three main reasons:

- The CBM "often assumes that you know something when you may not", which suggests that the CBM was not appropriately designed for the very beginner student;
- "It would meet my expectations if I had more time to do the course", which indicates poor time management skills and perhaps lack of motivation; and
- "Need more contact and advice from tutor", which suggests that the student was not receiving enough support from the tutor.

The students from case study B were not entirely satisfied with the fulfilment of their expectations either; however, only 30% of the students expressed a negative opinion. This was due to poor communication with the lecturer through videoconferencing, lack of personal interaction, and that the course was harder then the students had anticipated. By contrast, over 90% of the students from case study C reported having their expectations met. In considering the comparison, it is fair to assume that, as far as students' expectations are concerned, DE via multiple technologies was far more successful than DE via videoconferencing and even more than through CBMs. Moreover, students from case study C could have more support from their lecturers (via a range of communication channels) and occasional personal interaction on an as-needed basis as opposed to the rather limiting single technology used in case studies B and A, which as a result limited interaction and hence communication.
7.5.4 Acceptability

Table 7.5: Quantitative data on acceptability

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No data</td>
<td>(n= 9)</td>
<td>(n= 19)</td>
<td>N= 28</td>
<td></td>
</tr>
<tr>
<td>(+)</td>
<td>77.78% (+)</td>
<td>94.74% (+)</td>
<td>89.29% (+)</td>
<td>90.29% (+)</td>
</tr>
<tr>
<td>(-)</td>
<td>22.22% (-)</td>
<td>5.26% (-)</td>
<td>10.71% (-)</td>
<td>10.71% (-)</td>
</tr>
<tr>
<td>Learners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No data</td>
<td>(n= 30)</td>
<td>(n= 34)</td>
<td>(n= 16)</td>
<td>(n= 19)</td>
</tr>
<tr>
<td>A</td>
<td>63.33% (+)</td>
<td>58.82% (+)</td>
<td>91.42% (+)</td>
<td>75.36% (+)</td>
</tr>
<tr>
<td>B</td>
<td>36.67% (-)</td>
<td>41.18% (-)</td>
<td>8.58% (-)</td>
<td>24.64% (-)</td>
</tr>
</tbody>
</table>

Measures of acceptability levels provided an interesting analysis of contrast not only across case studies B and C but also between lecturers and students from these studies. The level of DE acceptability was quite high among the lecturers, overall nearly 90% of the lecturers (N=28) responded positively to DE acceptability. Lecturers from case study C reported higher levels of DE acceptability (nearly 95%, n=19) than lecturers from case study B (over three-quarters, n=9). Twenty two percent of the lecturers from case study B responded rather negatively to acceptability of DE via videoconferencing. This was due to the very static nature of the videoconferencing and hence, the constraints for role-playing. For example, one of the lecturers pointed out that "Videoconferencing would tend to make my teaching more formal i.e. less opportunity for role play etc". Moreover, this outcome was affected by the synchronous nature of videoconferencing technology such as time lags that limit the communication channel between students and lecturers, eventual breakdowns that interrupt the class and other details pertaining to the interface of the videoconferencing facilities, particularly for video and audio. For example, lecturers' comments include:

"The lack of human contact makes individual attention for students difficult, makes it hard to maintain levels of students motivation"

"Lack of dialogue due to fuzzy pictures and poor sound quality"

"Labelling of buttons and a set of refresher instructions/ manual at the operation desk"  
"System requires updating (…)"

However, the most critical issue that affected not only satisfaction but also acceptability was the weak management and organization of the DE via videoconferencing programme in case study B, as presented in chapter 5. This can be illustrated by the following examples of comments by the lecturers:

"I am frustrated because I have many more ideas which I cannot implement due to lack of management support"

"I teach after 5.00 PM so technical help set up the system but are not present for the session"

"No support after 5.00 PM and my classes start at 5.15 PM and go on until 8.15 PM".

The weak management and organization also affected the students. There was a lack of awareness that they were enrolling in a class via videoconferencing. Moreover, there was lack of induction sessions to familiarize them with the videoconferenced way of learning. For example, one of the students reported that:

"If the tutor could meet their class at the start of the course it would make it less intimidating for the first time users"

"The first class should have a member of staff to introduce the tutor at other end e.g. it is very intimidating at first and this feeling continues"

"Introduction to equipment and lecturer properly face-to-face first"

"If a problem occurs, there isn’t always immediate response from technical support - or we fix it ourselves if possible"

"Sometimes problems with sound, vision or the system being booked"

Conversely, over ninety percent of the students from case study C (n=35) found that DE via Internet technologies was acceptable. Only slightly less than 9% of these students responded negatively to the acceptability of DE via Internet technologies. This positive outcome was particularly influenced by the high level of acceptability by the students from sample A (n=16), whose response was 100% positive. Although, when taking into account the
students from case study B, the overall negative response was around a quarter (N=69), due to over 40% of these students, from case study B, responding rather negatively. These outcomes support the fact that DE via Internet technologies is more acceptable for lecturers and students than DE solely via videoconferencing.

7.5.5 Effectiveness of DE for specific tasks

Table 7.6: Quantitative data on effectiveness

<table>
<thead>
<tr>
<th>Variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness of DE for specific tasks</td>
<td>No data</td>
<td>M(sp) 3.00 (n=8)</td>
<td>M(sp) 3.71  (n=22)</td>
<td>3.52 N=30</td>
</tr>
<tr>
<td>Instructors</td>
<td>M(disc) 3.00 (n=7)</td>
<td>M(disc) 3.54 (n=11)</td>
<td>3.41 N=29</td>
<td></td>
</tr>
<tr>
<td>M(gw) 3.16 (n=6)</td>
<td>M(gw) 3.70    (n=7)</td>
<td>3.58 N=28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M(cons) 3.20 (n=6)</td>
<td>M(cons) 3.73  (n=11)</td>
<td>3.63 N=27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M(lec) 3.62 (n=8)</td>
<td>M(lec) 3.50    (n=11)</td>
<td>3.53 N=30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lecturers from case study C (N=22) rated the level of effectiveness of DE for specific tasks higher than the lecturers from case study B, except regarding DE effectiveness for lectures. This suggests that, from the lecturers perspective, the use of videoconferencing was somewhat effective for lectures, M(lec)=3.62. However, the use of multiple technologies was also rated as being somewhat effective for lectures by the lecturers from case study C, M(lec)=3.50, nevertheless, this aspect of the teaching process was considered to be the least effective task when using multiple Internet technologies. When overall lecturers' ratings were contrasted with the overall students' ratings, two out of five ratings were higher than the lecturers' ratings. Students found that DE was quite effective for students' participation, M(sp)=3.63; and for lectures, M(lec)=3.66. For all the other specific tasks, the overall lecturers' ratings were higher than the students' ratings.

When ratings of the students from case study B were contrasted with case study C, students from study C found that DE was quite effective for all the five aspects of the learning process considered. All their ratings were higher than the ones by the students from case study B. In fact, students from case study B found that DE via videoconferencing was neither quite effective for group work activities (2.76) nor for consultation with lecturer (2.62). These outcomes were rather negative for the students from case study B. However, the ratings by the students from case study C for group work activities and for consultation with the lecturer were fairly neutral. Overall, this means that regardless of the medium, whether Internet technologies or videoconferencing, DE is not particularly effective either for group work activities or for consultation with the lecturer as experienced by the students, M(gw)=2.92, N=57; and M(cons)=2.88, N=60; respectively. The next example illustrates some of the students' negative feedback pertaining to consultation with lecturers via videoconferencing in case study B:
"Occasional technical hitches. Being cut off in mid sentence at the end of the class. Very formal atmosphere"
"Small technical breakdown sometimes"
"Tutor cannot look over your work in class, may also be technical difficulties"
"Sometimes the equipment doesn't work effectively"
"Very impersonal"
"Sometimes problems with sound, vision or the system being booked"
"Feedback is difficult, concepts become unclear"

Consulting the lecturer was particularly limiting for the students from sample B of case study C. This limitation was due to fewer options being available when compared to the students from sample A. Furthermore, the options available, e-mail, telephone, chat on the Web, WebBoard, were not particularly effective for communication about mathematical and programming code types of problems. Examples that illustrate some of these issues include: E-mail, "Hard to explain problems with math". Chat on the Web: "Hard to specify details about math problems". Telephone: "hard to do math" and "(...) You cannot easily show your work, steps, Mathematica code, etc."

Students from case study C, particularly the students from sample B, explained that DE was not particularly effective for group work tasks. This was due to the fact that students pursuing degrees in the Mathematical Sciences would require a highly sophisticated interface capable of supporting co-operative work and sharing the same piece of work (e.g. programming code and mathematical problems), as revealed by the analysis presented in the previous chapter. One of the students commented that: "Way too complicated. Possibly for a different class like literature. Nothing with math (...)". One of the lecturers argued that "Technology hasn't quite caught up with our ambitions. We need faster connections, more bandwidth and better Web interfaces for using math". As far as limitations of the DE technology for group work is concerned, one of the students from case study B recommended that videoconferencing "would be used for lecture purposes only and not discussion groups".

### 7.5.6 Technical support

#### Table 7.7: Quantitative data on technical support

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support</td>
<td></td>
<td></td>
<td></td>
<td>N= 30</td>
</tr>
<tr>
<td>Instructors</td>
<td>No data</td>
<td></td>
<td></td>
<td>80% (+)</td>
</tr>
<tr>
<td></td>
<td>66.67% (+)</td>
<td>33.33% ST</td>
<td>85.71% (+)</td>
<td>20% ST</td>
</tr>
<tr>
<td></td>
<td>33.33% ST</td>
<td>0</td>
<td>14.29% ST</td>
<td>0</td>
</tr>
<tr>
<td>LEARNERS</td>
<td></td>
<td></td>
<td></td>
<td>N= 78</td>
</tr>
<tr>
<td></td>
<td>40% (+)</td>
<td>60% (-)</td>
<td>40% (+)</td>
<td>66.4% (+)</td>
</tr>
<tr>
<td></td>
<td>64.5% (+)</td>
<td>29% ST</td>
<td>80% (+)</td>
<td>19.22 % ST</td>
</tr>
<tr>
<td></td>
<td>6.45% (-)</td>
<td>20% (-)</td>
<td>21.95% (-)</td>
<td>14.58% (-)</td>
</tr>
<tr>
<td>Key:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(+) = Positive response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-) = Negative response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST = Sometimes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = Sample A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = Sample B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As far as technical support is concerned, the percentage of students from case study C who reported receiving enough support was the highest, (over three-quarters). The calculations tabulated (table 7.7) show that students from case study A were the least satisfied with the technical support received, only 40% reported receiving sufficient. Students from case study B were more satisfied with the amount of technical support received, nearly two-thirds of these students reported receiving enough support. However, they did not have to operate the videoconferencing facilities by themselves, as this was the role of the lecturer supported by the site facilitator (technician on site). Lecturers were slightly more satisfied with the technical support received in both case studies B and C. Overall, 80% of the lecturers surveyed (N=30) were receiving enough technical support against an overall percentage of two-thirds of the students surveyed (N=78) who reported receiving enough support. The fact that lecturers reported higher rates of satisfaction with the technical support received could be a consequence of bias as they were involved with their educational context, more than the students were. Thus, a negative outcome about technical support from lecturers could have negative implications not only for the technicians but also for themselves. The data analysis revealed that the technicians received a great deal of compliments, not only from students but also from lecturers. For example, compliments of lecturers from case study B include: "We have an
excellent technical department which is very helpful and supportive"; and "Dedicated and experienced technician". Compliments of lecturers from case study C include: "Academic outreach has been excellent and [technician] experience is first class"; "Excellent provision"; and "Our technical support is superlative (...)".

Although the percentage of contentment with the technical support received by the students of case study A was relatively low, they reported being satisfied with the on-line IT training. This raises a proposition that despite the difficulties and particularly the lack of sufficient technical support, students were still satisfied because they were given the opportunity to maintain their employability without having to travel to College and attend day or evening classes. As the on-line IT training fulfilled their job requirements as well as overcoming time and local constraints, they were more tolerant of the basic issues of technical support. Furthermore, the high percentage of contentment with technical support received by students in case study C, particularly the students from sample A (100%, n=16), was undoubtedly a strong contributing factor of success found in the DE programme of the Department of Library and Information Sciences. Students from sample B were less positive about the technical support received because they generally needed less technical support, due to the mathematical background and the gender differences. Thus, the provision of technical support in the Department of Mathematical Sciences was given by mentors who are postgraduate students and this seemed to cause frustration to the students who were more dependent on technical support. For example, students' comments included: "Mentors were unprepared"; and "I have tons of computer problems and no-one would help".

### 7.5.7 Learning support

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A (n=31)</th>
<th>Case Study B (n=5)</th>
<th>Case Study C (n=15)</th>
<th>Overall (n=77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning support</td>
<td>A 60% (+)</td>
<td>B 40% (+)</td>
<td>A 66.67% (+)</td>
<td>B 47.37% (+)</td>
</tr>
<tr>
<td></td>
<td>19.35% ST</td>
<td>20% (-)</td>
<td>33.33% ST</td>
<td>21.05% (-)</td>
</tr>
<tr>
<td></td>
<td>12.9% (-)</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Key:</td>
<td>(+) Positive response</td>
<td>(-) Negative response</td>
<td>ST Sometimes</td>
<td></td>
</tr>
<tr>
<td>A = Sample A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = Sample B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A further investigation revealed a pattern for learning support which contrasted with the results found for technical support. For example, students from case study B reported the highest rate of satisfaction with the amount of learning support received, nearly two-thirds were receiving enough support. Students from case study C reported the lowest rate of contentment with learning support, however, most of them were receiving enough support (56%). Overall, the percentage of satisfaction with the amount of learning support was lower (60%) than the overall result found for technical support (two-thirds) by the students. This contrast suggests that students might have been influenced, particularly students from case study A, by their job commitments. These students were recommended to take the on-line IT training by their bosses so that they could remain employed by increasing their productivity levels. A negative outcome regarding learning support would negatively affect their bosses in the local organizations who were paying the College for the students' training. For example, one of these students reported: "I would not like my comments to reflect badly on my College tutor. At all times she has been most helpful and encouraging, and given me confidence and belief in my own ability. For this reason I am determined to continue with the course".
7.5.8 The way DE is seen

Table 7.9: Quantitative data on the way DE is seen

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>The way DE is seen</td>
<td></td>
<td></td>
<td></td>
<td>N=32</td>
</tr>
<tr>
<td>Instructors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No data</td>
<td>55.56% ALT</td>
<td>43.48% ALT</td>
<td>46.88% ALT</td>
<td>46.88% ALT</td>
</tr>
<tr>
<td></td>
<td>22.22% SIM</td>
<td>13.04% SIM</td>
<td>15.62% SIM</td>
<td>15.62% SIM</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>4.35% SUB</td>
<td>3.13% SUB</td>
<td>3.13% SUB</td>
</tr>
<tr>
<td></td>
<td>22.22% OTH</td>
<td>30.44% OTH</td>
<td>28.13% OTH</td>
<td>28.13% OTH</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>8.69% ALT, SIM, SUB</td>
<td>6.25% ALT, SIM, SUB</td>
<td>6.25% ALT, SIM, SUB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learners</td>
<td></td>
<td></td>
<td></td>
<td>N=70</td>
</tr>
<tr>
<td>No data</td>
<td>A (n= 29)</td>
<td>B (n= 5)</td>
<td>A (n= 17)</td>
<td>B (n= 19)</td>
</tr>
<tr>
<td></td>
<td>58.62% ALT</td>
<td>76.5% ALT</td>
<td>66.4% ALT</td>
<td>64.3% ALT</td>
</tr>
<tr>
<td></td>
<td>20.6% SIM</td>
<td>11.8% SIM</td>
<td>5.3% SIM</td>
<td>17.12% SIM</td>
</tr>
<tr>
<td></td>
<td>20.6% SUB</td>
<td>0</td>
<td>10.5 SUB</td>
<td>11.38 SUB</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>11.8% OTH</td>
<td>15.8% OTH</td>
<td>7.15% OTH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(n= 34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55.86% ALT</td>
<td>72.22% ALT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26.39% SIM</td>
<td>8.37% SIM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.57% SUB</td>
<td>5.54% SUB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>13.91% OTH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
ALT = Alternative to traditional education
SIM = Attempt to simulate traditional education
SUP = Supplement to traditional education
ENR = Enrichment to traditional education
SUB = Substitute to traditional education
OTH = Others
A = Sample A
B = Sample B

As far as the perceptions of DE by lecturers and students are concerned, the data analysis has revealed a significant contrast. Less than half of the lecturers surveyed (N=32) saw DE as being an alternative to traditional education while approximately two thirds of the students (N=70) saw it as an alternative. However, this difference could have been even higher if the students from sample B of case study B saw it in the same way, but in fact they saw it as an attempt to simulate traditional classroom experience. Another distinctive result was found between the way DE is seen by students from case study B and case study C. For example, slightly over a half of the students from case study B saw DE as an alternative, while nearly three quarters of the students from case study C saw it as an alternative approach. Despite most of the responses being that DE is seen as an alternative approach, most of the students from sample B of case study B saw DE as being an attempt to simulate traditional education. This perception is particularly related to the form of technology being used to deliver classes at a distance in this case study. This may be a determining factor for most of their negative attitudes towards DE. Moreover, the percentage of students from case study B who saw it as an attempt to simulate traditional education was much higher than the percentage found for students of case study C because most of them saw it as being an alternative to traditional education. This contrast indicates that the two different modes of delivery, videoconferencing via ISDN and multiple Internet technologies, have an impact on the way students perceive DE. Therefore, their perceptions affect their attitudes towards DE. Findings obtained from the data analysis of the survey with the students from sample B of case study B are examples of this interesting relationship, since this cohort reported most of the negative outcomes. Even though their attitudes were rather negative, this does not mean that their perceptions of this particular mode of instruction were distorted. On the contrary, according to IDE (1997), the nature of the experience of learning through videoconferencing via ISDN mimics that of the traditional classroom for both the lecturer and the students.
7.5.9 Continue with DE/Dropout

Table 7.10: Quantitative data on continuation with DE/Dropout

<table>
<thead>
<tr>
<th>Quantitative variables</th>
<th>Case Study A</th>
<th>Case Study B</th>
<th>Case Study C</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continue with DE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructors</td>
<td>No data</td>
<td>(n= 9)</td>
<td>(n= 23)</td>
<td>Overall</td>
</tr>
<tr>
<td></td>
<td>100% (+)</td>
<td>95.65% (+)</td>
<td>96.87% (+)</td>
<td>96.87% (+)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>4.35% (+)</td>
<td></td>
<td>3.13% (-)</td>
</tr>
</tbody>
</table>

| Key:                   |              |              |              |         |
| (+) = Positive response|              |              |              |         |
| (-) = Negative response|              |              |              |         |
| A = Sample A           |              |              |              |         |
| B = Sample B           |              |              |              |         |

| Learners               |              |              |              |         |
| No data                |              |              |              |         |
| A (n= 29)              | 72.41% (+)   | 100% (+)     | 84.2% (+)    | 81.42% (+) |
| B (n= 5)               | 27.59% (-)   | 60% (+)      | 15.8% (+)    | 18.58% (-) |

| (n= 34)                |              |              |              |         |
| 70.58% (+)             |              |              |              |         |
| 29.42% (-)             |              |              |              |         |

Despite some discontentment and frustrations, overall lecturers and students reported high levels of willingness to continue teaching and learning at a distance. In fact, this outcome was the most positive among the quantitative data presented in table 7.10, nearly 97% of the lecturers (N=32) reported that they would continue teaching at a distance and slightly more than 80% of the students (N=70) also reacted positively. These outcomes confirm that the DE programmes were effective in both case studies B and C (no data about case study A). This was because the dropout rates would have been unusually low for DE programmes where the dropout rates are typically high (e.g. nearly 50% was found by Masson in 1988 at the Télé-université, Quebec). Remarkably, 100% of the students (n=17) from sample A of case study C reported that they would continue learning at a distance. This outcome shows more evidence of the success of the DE programme of sample A in case study C. Conversely, the highest levels of discontinuation of learning at a distance were reported by students from sample B of case study B. This is due to the high percentage (80%) of students from sample B whose preferences were for traditional education if they were offered the choice. Reasons for that may be that their acceptability of and satisfaction with DE did not increase with the experience gained and familiarity acquired with DE via videoconferencing. For example, their comments include: "Didn't suit me, not this semester" and "I prefer normal education techniques".

7.6 The development of conceptual frameworks and models

To accommodate findings obtained from quantitative data as well as qualitative data analysis, a common conceptual model is used to summarize each case study. Each is developed into a two-track model. The positive track contains factors which lead to success while the negative track indicates weaknesses in these factors, hence they could lead to outcomes of failure. However, these factors do not lead to failure because the strong factors work to compensate for the weaknesses and enable good learning outcomes to be achieved. The next sub-section describes a conceptual model for each of the three case studies carried out.

7.6.1 Conceptual Models

The conceptual models are presented as an attempt to reduce the data obtained from the case studies to a structured cause and effect framework. The development of these models is important because they provide a conceptual understanding of the factors that affect effective DE programmes as well as factors that enhance effectiveness. As such, they also provide an insight into the elements of an organizational system that promote or impair effective DE programmes. The next three diagrams (figures 7.2, 7.3 and 7.4) illustrate these models. The black boxes represent the strong factors; the dark grey boxes represent the factors that are neither strong nor weak; while the light grey boxes represent the weakness that could lead to students' outcomes such as: dissatisfaction, frustration and dropout if the strong factors were not able to overcome such weakness.
In case study A (on-line IT training), weakness in the CBM put pressure on the tutors to fill the gap between the learners who were beginners and the CBM. The beginner learners did not have the appropriate background skills necessary to undertake the course independently, and the level of basic skills required by the CBM seemed to assume some basic skills that the very beginner learner did not possess. The roles and responsibilities of the College were increased and the tutors were pressurized to overcome the weakness of the CBM by supporting the beginner learners with more communication, face-to-face meetings, handouts and 'help sheets'. This was due to lack of support for the training by the local organizations.

Successful accommodation by the social system was the key element responsible for these positive outcomes.
b) Conceptual model of DE via videoconferencing - Case study B

In case study B (DE via videoconferencing), the roles and responsibilities of the institution were underestimated. Evidence of weaknesses in the management and organization of the videoconferencing programme by the university was revealed. For example, one group of students reported that they were unaware that the classes they had enrolled in would be delivered by videoconferencing and that they would be the remote site students while the lecturer would be located miles away. Other evidence was that there was confusion sometimes when a lecturer would book the videoconference lecture room for his class while another lecturer had previously booked it for the same day and time. In contrast to what happened in case study A, there was little that the lecturers could do to overcome the weakness of the management and organization by the University. This lack of control caused dissatisfaction and, hence frustrations not only for the lecturers but also for the students.

Figure 7.3: Socio-technical conceptual model of DE via videoconferencing delivery

As in this case study it was not possible for the social system to accommodate, there was a low level of satisfaction.
c) Conceptual model of DE via multiple Internet technologies - Case study C

Although, in case study C, the technical system, the organization, and management by the University were strong, there were some minor contrasts revealed by the data analysis.

For example, less than a half of the students from sample B were receiving enough learning support. This contributed to it having the lowest percentage of satisfaction with learning support received by the students of the three case studies.

Figure 7.4: Socio-technical conceptual model of DE via multiple Internet technologies delivery
7.7 The development of conceptual frameworks and models for the planning of effective DE programmes

A number of scholars have been concerned with the development of conceptual models capable of enabling their colleagues to plan effective DE programmes (e.g. Jackson, 1993). As time is increasingly becoming a precious commodity, particularly in the current competitive environment, efficiency as well as effectiveness have become the ultimate business goal, not only for private institutions but also and increasingly, for government institutions. In such an environment, educational institutions on both sides of the Atlantic have been forced to widen their audience of students. As discussed earlier (chapters 1 and 2), DE has arisen as a promising strategy that enables current educational institutions to fill the gap between the traditional models of education and the current demand for continuing, above all, flexible models of education. However, even though significant efforts and attempts have been made, effective DE has not always been achieved due to a number of issues, described earlier, that can potentially affect the desired outcomes of success as discussed in chapters 4, 5, and 6. In order to avoid coping with the consequences of various issues when a new DE programme is implemented, conceptual frameworks were developed. These frameworks provided a useful insight into the development of a planning aid tool. In fact they were the structural basis for a dual-purpose tool that not only systematically supports the early stages of planning an effective DE programme, but can also be used as a formative evaluation tool. The next sections present the discussion regarding such a development. Firstly, the conceptual frameworks are presented and secondly, a conceptual model of effective DE is discussed.

7.7.1 Conceptual frameworks and models for planning effective DE

This section focuses on the planning component of this process because, with appropriate planning, many incorrect steps can be avoided (Lehman et al., 1998). Dick and Carey (1990) consider that the initial planning steps of the process should include: identifying an instructional goal, analysing the type of learning required of the learners, and analysing the characteristics of the learner (Lehman et al., 1998; p.133). However they did not mention the decision making process. The DE planning aid tool presented in this chapter provides, in a range of frameworks and models, a systematic view for guiding the kinds of aspects that have to be taken into account for planning an effective DE initiative. Of course, after the lessons learned from the socio-technical models of three different delivery systems (figures 7.2, 7.3 and 7.4), those aspects do not necessarily need to be strong in order for the DE to be effective. However, the ultimate goal of the research in human factors is to minimize accommodation by the social system so that negative stakeholder outcomes, (e.g. disillusion, lack of motivation, dropout, disturbed sleep patterns and learning) can be avoided. As such, the frameworks are divided into five main aspects that have proven the most relevant when planning DE programmes according to the previous literature review (chapter 2) and the results of the three case studies (chapters 4, 5, and 6):

- Information about the students
- Infrastructure access
- Decision making process for technology choice
- Allocation of roles and responsibilities for staff members
- Decision making process for meetings (face-to-face)

Likewise, the decision-making process for choosing the appropriate technology was divided into five aspects. For each of these aspects, a conceptual model was designed to illustrate the causal relationships between factors that enhance effectiveness and those that impair it:

- Communication
- Instruction
- Delivery
- Support
- Evaluation

7.1 The conceptual model for deciding on the appropriate technology for evaluation has not been included in this chapter due to the lack of a popularized electronic tool for it. Nonetheless, that is not to say that appropriate tools are unavailable, on the contrary, these are just not being widely used at the time of this survey.
There are a number of aspects, related to the students’ personal data, that can influence the process of planning an effective DE programme through network technologies. For example, imagine a scenario in which the student is a middle aged woman, divorced and mother of three children who works full-time in a managerial post of a small local government office. She gained a degree in social sciences in the sixties and has no previous experience with learning at a distance and has very poor ICT skills due to the outdated computer facilities in her office and lack of personal interest. Nonetheless, her ambition is to maintain her job position but her knowledge and skills need updating because of the demands of new technologies being implemented at work as a result of a government reform. Her main site of instruction will be at home where she will have to cope with a combination of study and family commitments. In this scenario, it seems that there are a number of factors that could potentially affect her learning abilities. As such, at this point in this research it appears to be crucial to take into account, individual information about the students in order to design a DE programme sufficiently flexible to accommodate different students’ characteristics, backgrounds, needs, commitments, ambitions and, interests.
b) Infrastructure access framework

A number of services and resources were identified as being worthy of careful consideration when planning effective DE programmes. Distant students have to be able to access such services and resources in order to learn in an effective and equitable manner in the same way as traditional students who have easy access to those facilities on campus.
The third aspect of concern when planning effective DE programmes is the decision making process for choosing the appropriate technology for communication, instruction, delivery, support, and evaluation. Communication, as seen earlier, is a crucial element in DE, especially individual communication between a student and a lecturer. It is also important, between groups of students and between an entire class and the lecturer. As such, the decision about the appropriate technology has to be made carefully and it will depend on the kind of communication most commonly used. As previously discussed (chapters 4, 5, and 6), the decision about the appropriate technology for instruction needs some care. Instruction can be divided into four types: lecture, discussion, tutorial, and group work. It was also concluded that the same technology, which seems to be appropriate for a lecture does not seem to work well for group work activities. Therefore, one should take into account the range of different state-of-the-art technologies available and discuss their applicability with colleagues who may have tried them before, to understand their implications and capabilities. This will help in making the right decision on the most appropriate technology that is best suitable for each of the educational tasks.

Nonetheless, the technology may not be mature enough to allow for appropriate support of students, for example, it would be difficult to provide social or counselling support through network technologies, if the very crucial component of this kind of support is the personal interaction (face-to-face) between two or more people. Likewise, evaluation of lecturer’s teaching and perhaps other assessments would require evaluative tools capable of handling qualitative data in an effective way so that it would be worth adopting. Otherwise, in some similar cases, one is better off not using technologies at all, and instead, adopting the traditional ‘tried and tested’ approaches.
There are, basically, three kinds of communication: between the lecturer and the students, between the entire class of students and the lecturer, and between groups of students. As such, results from the earlier case studies have been structured in a flow chart format so that the causal relationships between factors that enhance effectiveness and those that impair it could be modeled. For example, findings have indicated that communication between groups of students or between a class of students and the lecturer via electronic chat on the Web, can be confusing due to poor management of this tool for handling large groups of people demanding the lecturers attention synchronously.
c.2) Conceptual model of instructional delivery technologies for instruction

Instruction was divided into four distinct formats: lecture, tutorial, discussion, and group work. As was observed, findings from the three previous case studies have indicated that the appropriate technology for individual communication applies for tutorials because it refers to interaction between the lecturer and a student. For example, a lecture via the Internet using RealAudio can be limiting and inefficient if it is only one-way rather than two-way. In other words, only the lecturer can speak, students have to provide feedback by keyboarding their responses or comments. In order to complete the blank boxes of this model, more information needs to be gathered to understand other Internet tools e.g. FirstClass or appropriate technologies for tasks involving group work.

Figure 7.9: Conceptual model of instructional delivery technologies for instruction
As far as delivery of instruction is concerned, the model is divided into two major aspects: delivery of content, i.e. instructional material, and delivery of students' assignments. For example, it was concluded that inappropriate CBM packages lead to student frustration. Another finding regarding delivery of students' assignments indicated that submissions on the deadline cause lecturers' mailboxes to be overloaded. During one interview with a lecturer from a North American University, it was revealed that many students submit their work a few minutes before the deadline, so network congestion slows down transmission, depending on the connection speed.
c.4) Conceptual model of instructional delivery for support

Figure 7.11: Conceptual model of instructional delivery for support

So far, four kinds of student support have been identified. However, in the next chapter (8), other kinds of support are added to the model. At this point in this work, the four support areas identified were: technical, academic, administrative, and English for international students. The three former are popularly done through e-mail or telephone. If a staff member (e.g. a technician, a lecturer, or a secretary) is not responsive to e-mail, students feel frustrated and if a student phones from a geographically distant location, there will be costs and difficulties in synchronizing schedules due to time zone differences. In the case of English support for international students, the range of technology used can be the same as used for content delivery: www pages, CBM packages, videoconferencing, and RealAudio. Therefore the same range of consequences for to the students occurs (see figure 7.10).
d) Framework of allocation of roles and responsibilities for staff members

Another crucial aspect that deserves attention when planning DE programmes is the allocation of roles and responsibilities to staff members. At this point in this work, staff roles and responsibilities are divided into five main areas of support: administrative, technical, academic, counselling, and English support for international students. However, at a more advanced stage of this work, this framework is completed by adding other roles and responsibilities that need consideration in the early stages of planning DE programmes.

Figure 7.12: Framework of allocation of roles and responsibilities for staff members

There is another very important decision to be made when planning effective DE programmes. This is regarding the right balance between DE and traditional education within the programme. Therefore, it requires the
identification of how much of the programme actually has to be in a face-to-face format and what exactly can be delivered in a DE format in order for the programme to work effectively. For example, five aspects were identified as being important and more appropriately delivered and discussed in a face-to-face format: the induction session at the start of the course, the introduction of basic concepts of DE, setting procedures, making expectations clear, and the introduction to local libraries and laboratories.

7.8 Summary

The development of these conceptual frameworks and models derived from the previous conceptual frameworks of the issues in DE were developed for each case study and presented at the end of chapters 4, 5, and 6. The socio-technical conceptual models of diverse DE delivery developed for each case study would not have been possible without: (1) an in-depth understanding of the DE phenomenon of each case study (chapters 4, 5 and 6); and (2) the cross-case study comparison analysis (outlined in the beginning of current chapter). This is because this analysis provided evidence of how the weak and strong elements of the socio-technical DE delivery systems compensate one another in order for the DE delivery to work effectively. As such, rather than focusing on the socio-technical issues surrounding the delivery of DE programmes (presented in chapters 4, 5 and 6), the conceptual frameworks and models for planning effective DE provide the first attempt to formalize the crucial factors for the planning of an effective DE programme in a range of causal structures. However, it was also learned that the social system accommodates as a result of a weak technical system. This means that the frameworks and models for planning effective DE attempts to offer a contribution to minimize the social accommodation. As seen earlier in this thesis, long-term social accommodation leads to human costs and these can lead to a series of undesired outcomes. In the next chapter (8), the fourth case study (case study D) is presented, followed by an analysis of its results and findings that allow for the reliability of the planning aid tool to be tested and as a consequence the current frameworks and models for the planning of effective delivery of DE to be updated.
Chapter 8

Important Issues in Planning Effective Delivery of Distance Education - Case Study D

8.1 Chapter outline

This chapter outlines the analysis of the issues in planning Distance Education (DE). This analysis was motivated by the research that Goodman published in 1999 on "Validating factors that impact on the success of distance learning initiatives". The DE planning phase requires the consideration of a number of issues (variables) that need to be examined. However, identifying them is the first step in pursuing a model of effective DE (Goodman, 1999). In the previous chapter (7), a range of frameworks and models of DE issues was developed to guide the planning of successful new DE programmes. This chapter presents an account of the fourth set of sub-case studies D1-D7 (case study D) that was carried out to test these frameworks and models. The results from this test are examined in this chapter to identify new important issues that emerged from the case studies. Thus the frameworks and models are reviewed against the results and from this a more complete version is developed. Figure 8.1 illustrates chapter 8 in relation to the overall thesis structure.

8.2 Introduction

While a considerable number of case studies are identifiable in the literature, far less research was found which sought to identify the factors that were critical to the success of DE programmes (Goodman, 1999). Goodman argues that research into the factors that impair or contribute to the success of DE programmes is in its embryonic stage and that any effort in this field would be a starting point in order to realize the full potential of DE programmes. Consequently, the value of research into identifying critical success factors is worthy. Other areas are bound to benefit from a rise in the success rate of DE programmes such as easier marketing, a decrease in the investment risks and an increase in the organizational motivation for this "agent of change" (Goodman, 1999).

Wagner (1995) carried out a study in which she identified 16 variables which need to be considered if a DE programme is to be successful: needs assessment, audience analysis, instructional design, course selection, course reconfiguration, lesson planning, interactive instructional strategies, instructional delivery systems, adapting media
and materials for distant delivery, developing effective graphics, using facilitators at distance education sites, students and lecturers support services, programme evaluation and student assessment, organizational readiness, inter-institutional partnerships, and the regulatory environment. Although, her study was conducted more then five years ago and there has been a considerable advance in the application of technology that has impacted on the practice of DE, her study is still a useful guide to those issues which demand consideration if the DE endeavour is to be successful. However, in 1999, Goodman conducted a study to test the validity of Wagner's variables. Although Wagner's list was validated, he found out that there was a case for Wagner's list to be expanded to include some additional factors. For example, Goodman's list added issues about understanding the technology, budget, and the suitability of the technology.

8.3 Objectives

- This fourth case study aimed to test the reliability of the frameworks and models presented in chapter 7. These frameworks and models have proven successful but minor additions were necessary to complete them so that they can be used as an effective tool for the planning of future successful DE programmes in the UK;

- The work presented and discussed in this chapter (8) aimed to respond to one of the research questions posed by Goodman in the article mentioned earlier: "Is it possible to prioritise the variables that impact on distance learning in terms of importance?" (p.20). In Goodman's work, factors that were considered by the programme manager of each case study were identified, but it was not possible to measure the level of importance of each factor. This was due to the limitations of the methods and materials used; and

- In addition, the work reported in this chapter aimed to overcome this gap by using a Likert-type questionnaire with seven staff members who were directly involved in the planning of DE programmes during this survey.

8.4 Methods

The main method of data gathering was semi-structured interviews with seven staff members directly involved in the planning of DE programmes at this University. In this case study, the semi-structured interviews were tape recorded and carefully analysed, allowing an in-depth study to be conducted. Consequently, this case study (D) was divided into seven small-scale sub-case studies called: D1 to D7. A Likert-type questionnaire was administered to the participants to collect data on the importance level of each issue. The issues are the ones presented in the previous chapter (7) in the form of frameworks and models. The following section presents the results and their connection with the form of DE being planned by each member of staff who participated in this study. A copy of the interview protocol and the questionnaire is in appendix D-I and D-II, respectively.

8.5 The University

Case study D was held at an English University in the East Midlands area of the UK. This UK University has a population of 12,000 students of which 2,000 are international students. Independent assessments of the teaching quality and the survey in The Financial Times of April 2000 placed Cambridge and this University first equal in the results of External Subject Reviews. The University is well known for its strong collaboration with industries in both teaching and research and was awarded two Queens' Anniversary Prizes for Higher and Further Education. Consequently, the University is committed to the development of innovative strategies for teaching and learning.

The Learning and Teaching Development Unit (L&TD) at this University is committed to student-centred teaching and learning and provides an environment which facilitates student involvement in the learning process. This flexible learning approach recognizes the need to maintain and enhance teaching quality at a time of rapidly increasing student numbers with an increasingly diverse student population (Wade, 1997). In the face of such a reputation, the University's staff members find themselves reluctant to start DE initiatives in their departments. Likewise, the senior level staff find it difficult to support and encourage initiatives that will most likely have an impact on such already well established high quality achievements. Changes are normally initiated when the current
situation is not sufficiently good. However, when the current situation is already reasonably good, changes of this kind might be delayed due to extreme caution to avoid negative outcomes that would affect the reputation of the University. As a result, DE initiatives in this University have been quite slow when compared with some other UK universities or some North American universities.

All these factors might have had a negative impact on funding and grants for new developments in DE, which further impairs and delays DE initiatives in this University. On the other hand, because of its extreme caution, staff members have to spend a great deal of time and effort in the early planning stages of the DE programme's development process in order to avoid making mistakes once the programme is delivered. The next sections provide a brief account of each sub-case study.

8.5.1 The sub-case studies

As mentioned earlier, case study D was divided into seven sub-case studies because each one differs in its planning stages of the development of their DE programmes. Figure 8.2 illustrates the specific stages in which each sub-case study programme was found at the time of this study.

Sub-case study D1

The Department of Human Sciences is in the early stages of planning their Master's degree in Human Factors and Information Technology. This provided an appropriate setting for this first sub-case study (D1). The interviewee was the Director of the Research Group (interviewee n° 1) who is responsible for doing the initial planning of the DE programme. He is also responsible for the project proposal and submitting it to internal teaching committees for approval.

Aims of the DE programme in Human Factors and Information Technology

This programme aims to enable students to recognize the significant human issues at every stage of the development of new technology systems and its implementation. The students will learn how to find the appropriate methods and practice so they will be able to build their own knowledge. The students' profile will tend to be people in employment who may come from a number of backgrounds and, eventually, find themselves in a situation where they have to develop new technical systems and implement them in their organizations. As a result, there is a demand to deliver this kind of knowledge because, to the knowledge of the interviewee, there is no existing DE course bridging this gap.

The general goal is, therefore, to try it on a UK national basis before it can be expanded into an International market. As it is in its early stages, a planning group has been appointed to formulate the way forward,
including making decisions about what portion (module(s) of the course) is to be delivered at a distance and what is going to be delivered traditionally. That planning group includes or interacts directly with the staff who will be the module organizers. The Master’s course will probably consist of twelve modules (twelve separate courses) and a project. The planning group will work with the lecturers responsible for those modules. The planning goals also include looking at materials already available electronically.

**Issues considered during the initial planning**

**Approval:** When the planning process matures, there is a concern about the set of formal mechanisms the DE course will have to undergo. For example it will have to be reviewed by the University’s teaching and learning committee, fitted to the University’s policy, get internal accreditation, be approved by the Faculty of Sciences, and get external accreditation by the official professional body, e.g. the Ergonomics Society.

**Relationship with organizations:** There have been concerns about the kind of relationship the DE programme will have with the organizations that employ the students on the course. Contact with large companies has revealed a concern about the site of instruction. According to the interviewee, some organizations had stated that they would allow their employees to do the course while at work. As a result, they would be able to access and use the company’s workstations from the University, which would need to be linked to them, and respect the organizations’ systems. Otherwise, organizations would have places where the employees would go to study, and the DE programme would then deliver the material to them. Other organizations were less supportive, they would allow their employees to do the course but they would have to do it from home. As such, there is a concern about the site to which the course would be delivered.

**Syllabus:** Three issues about the syllabus were identified during the interview, particularly regarding how to adjust the syllabus to the DE course. Firstly, there are two other Departments that are also tentatively moving towards a combination of DE and traditional based instruction in related subject areas. These courses have overlapping modules with the Master’s DE programme, so part of the planning involves planning together by engaging staff from these two Departments and ensuring that every course fits together. Secondly, the right balance has to be struck between distance delivered instruction and the on-campus based instruction. Some modules will probably require that the students would attend lectures on campus for a short intensive course, while other modules could be delivered totally at a distance. Consequently, there is some work to be done about what will be taught at a distance and what will be taught traditionally. Thirdly, the right amount of flexibility to deliver courses will be required according to the needs of the students who will come from various companies which have a number of distinct interests.

**Lecturers’ reactions:** According to the interviewee, there were some concerns about the lecturers’ reactions when the department announced the plans for delivering courses at a distance. Some of the lecturers naturally reacted with some degree of hostility: ‘I can’t see how I can teach that module at a distance’ or ‘I want it in my laboratory, I want them [the students] to experience thermal discomfort, I need them on an exercise bicycle’ (excerpt from interview). So each lecturer has been asked to identify what can be done at a distance and what cannot.

**Marketing:** By visiting a number of large companies, and talking to them about how to develop their Human Factors skills and competence, the target population could be established so that the companies would guarantee that there would be a number of students enrolling in the course. The next step was to establish who the target population would be (i.e. the students’ profile), and it was decided that it would be professionals who have become involved in designing and implementing systems. Many of them have a background in psychology and have come to this field with a human perspective but lack the specific techniques and knowledge. They are people in middle age, who do not want to take a year off to go to university on a full-time basis. Instead, they want to be able to do the course while at work.

**Material:** The materials for this programme cannot be bought from any software manufacturer due to a current lack of available and appropriate materials and suppliers. The programme’s staff would have to develop all of the materials by themselves. There are two important aspects that result from this. Firstly, if the staff produce all the material, and if they prove successful, the ambition would be to control the market and license them to other universities. Secondly, the downside of this is that this would require intensive labour and would be costly. The interviewee reported:
'One of the troubles is that, it's probably not too difficult to take people's notes and put them on the screens, but, really, that is not making the best advantage of the distance learning material. I am particularly keen on creating a lot of case studies and asking people to do exercises with these case studies, which is the more interactive way of teaching, but it's enormously time-consuming because we have to create all these things'.

(Interviewee n° 1, 2001)

**Funding:** These issues cannot be tackled without recognising the underlying issue of a current lack of funding. Therefore, staff can not be appointed to do all the tasks that have been foreseen. The interviewee mentioned that this lack of funding has been 'one of the most critical obstacles at the moment'.

**Resources:** Currently, this programme only has the Director who is the programme organizer (interviewee n° 1). During the interview, he mentioned that he is looking for funding to appoint staff to work on all the planned tasks.

**Sub-case study D2**

The Department of Human Sciences also provided the setting for this sub-case study (D2) due to the very early stages of planning its Master's degree in Ergonomics by distance learning. The interviewee was the Director of the full-time Masters' programme (interviewee n° 2), which has run in a traditional form for over 30 years.

**Aims of the DE programme in Ergonomics**

The aims of this programme would be similar to the current full-time Master's programme which is to enable individuals who have relevant previous educational background and in some cases, also with relevant working experience, to be educated in and practice Ergonomics as professional ergonomists. The DE course would enable people at work to take advantage of the DE format. As a result of the number of requests from people from abroad and the fact that it is costly for those students to do the full-time Master's course, the programme's aims include a way of enabling those individuals to take advantage of the programme at a lower cost to themselves. According to the interviewee, there is evidence through the UK Ergonomics society and the International Ergonomics Association, that there is a demand for professional ergonomists, not only in the UK but also in a wider context, that is not being met by the current educational institutions around the world. Therefore, he feels that the Department's academic staff can play a role in filling some of the gaps between this demand for professional ergonomists in the workplace and the provision of education by the educational institutions. 'We believe that we have a lot to offer and can make this happen. So the 'why' is not only that we have a demand, it is also looking the other way and believing we have something to offer' (Interviewee n° 2, 2001).

During the current early stages of the planning, the interviewee had foreseen a number of issues that needed consideration. Decisions had to be made. For example, as professional ergonomists 'not only need to know things, they need to do things, it's a practical discipline'. There are a number of concerns about the extent to which practical tasks can be taught at a distance. As a result, the students on the programme will be required to attend short classes on campus. Visits by the academic staff to other locations in Britain would also be considered whenever necessary.

**Issues considered during the very early planning stages**

**Programme's structure:** Due to the practical nature of Ergonomics, there is an issue about how to deal with the requirement for a short course on campus with the international students, who would be located abroad. This would justify the programme having branches (e.g. local centres) around the world where there would be a significant number of students. The interviewee gave the example of Sydney where there are a large number of students interested in the DE programme on Ergonomics. This system however, comparable to the UK Open University (UKOU), would demand the provision of a rather large programme. Nevertheless, Ergonomics as opposed to the range of disciplines offered by the UKOU, is a particularly small field and, to the knowledge of the interviewee, there is no evidence that this (this DE programme) could meld into that way yet. Moreover, provision of local support (by the local centres) around the world is an enormous undertaking to organize, manage, and administer.

**Provision of student support on an individual basis:** The interviewee appeared to be concerned with the provision of specific support for students who would be facing difficulties. For example, many of the Master's students of the current full-time programme find that they need extra help when dealing with data analysis and statistical approaches. As such, the academic staff at this Department are used to providing this support by
responding to these students in the following ways: 'Come and knock on the door; Come and spend half an hour, let's discuss this'. As a consequence, lecturers expressed discomfort about whether they would be able to provide this kind of support via e-mail. It could be very attenuating, slow and laborious. Hence, lecturers are not yet confident that they have an appropriate way to provide the more individual sort of support which they think becomes necessary in DE.

Workload: The amount of work that a DE programme requires was mentioned during the interview:

'As soon as one begins to look at it in any detail, it's clear there is an enormous amount of work to develop a proper distance provision and it isn't just the one of preparing materials however time-consuming that would be. The materials can't last forever so they have to be continually reviewed'.

(Interviewee n° 2, 2001)

This excerpt from the interview reveals evidence that lecturers are particularly hesitant and apprehensive about DE. This is because of the commitment the University has for high quality education and a number of other issues result from this attitude. In particular, this is a concern for the lecturers because they are expected not only to deliver the existing programme but also to do research and administration. They felt that there is no spare time to develop the DE programme.

Cost-benefit: The academic staff believe that they can potentially expand the University's income if the DE courses prove successful. However, the interviewee recognizes that more market research is needed to understand whether there would be a cost-benefit for the University, for themselves (the lecturers) as well as for the students.

Funding: Being currently in the very early stages of planning a DE programme, many issues are being identified and discussed with other lecturers in the Department. The lecturers have not yet tried to examine these issues or to carry out market research to find out whether a DE programme would be worthwhile. The interviewee is beginning to think about what kind of funding source there might be to enable the lecturers to have extra staff to help them in the preparation of this programme. He recognizes that nothing can be done without additional resources.

Resources: At the moment, the programme only has the programme organizer (Interviewee n° 2). As far as materials are concerned, the interviewee stated:

'Ergonomics is not, perhaps, quite in the same category as some other areas (...) in medicine, there are a lot of resources already available. There are publishers who produce CD-ROMs. Indeed staff around the world have Web pages and so on, because it's a major area of interest not only in many British universities but globally (...). I think the difficulty for Ergonomics is that it's a much smaller profession and there has been much less opportunity, up to now, for these materials to be developed. And so we are starting from a less well-resourced base than might apply to other areas. There are, of course, materials that already exist in the medical field, perhaps physiotherapy or psychotherapy, materials that might be relevant but they are very often, very poorly focused for ergonomics'.

(Interviewee n° 2, 2001)

Sub-case study D3

The Centre for Renewable Energy Systems (CREST) of the Department of Electronic and Electrical Engineering provided the setting for this sub-case study (D3) due to its current well advanced stage of planning its DE programme in Professional Development in Renewable Energy. In fact, this programme is currently being run with 73 students enrolled in this industrial course. The main units taught at a distance refer to specific subject matter within the fields of wind power, biomass energy, hydropower, and solar power. The programme does not offer a degree due to it not yet being accredited. The interviewee (Interviewee n° 3) was the project manager of this DE programme for industry professionals. The project is EU (European Union) funded: European Social Fund (ESF) for year 1; and Engineering and Physical Sciences Research Council (EPSRC) for years 2 to 5. EU funding relates to the development of industry specific DE units and the EPSRC funding relates to the conversion of the existing Master's course to DE format. Due to its advanced planning stage, the range of aims and issues revealed by the interview, were significantly different from the previous two sub-case studies.

Aims of well advanced programme planning

As a result of a previous project contract, there are a number of existing materials already developed that provided initial tools for assessing the training needs of the target group. The target group includes the renewable energy industry in the UK, which encompasses non-governmental organizations such as the Centre of Alternative
Technology in Wales. These organizations are involved in supporting SMEs (Small/Medium Enterprises) to become more competitive because there is an identified need to support professionals within these SMEs to develop competencies in areas that make them more competitive with a long term strategy to develop it globally. 'So this is very much a trial project with a view on the global market' reported the interviewee. Based on these assessments, a survey questionnaire was designed for gathering data on students' needs for a subsequent analysis. Moreover, 50 organizations expressed an interest in the DE programme, hence the questionnaires were sent out to the contact person in each of these organizations. Promotional material for marketing the programme has also been developed and sent out to the organizations. The survey included:

- Contact information, computer facilities details, platform details (e.g. IBM or Macintosh)
- Whether the employees used computers with DVD-ROM, CD-ROM
- Level of Internet access, whether the organization would allow them to have access to the Web and how often
- How much time in their working week, they could spend studying

The approach was to obtain baseline data to enable the design of the materials, which were not previously designed for this target group's needs. Course content had to be appropriately designed to suit the individual needs and limitations of the employees and their computer configuration and capabilities, so the approach was a student-centred one. In teaching adults with considerable professional experience, it was anticipated that these students had the ability to manage their own time and to take charge of their own learning, so some level of control of their own programme was expected. As such, one of the goals was to design a structure by which they could make use of that level of control. In order to design the syllabus, individual needs were met by offering relevant modules of the course, so there was a significant change in the way the materials were developed. With the new unit-based syllabus, a much greater flexibility could be offered. The interviewee exemplified:

'(...) Within the solar industry sector, for instance let's take a company like BP Solar, you have a wide range of employees who have a wide range of responsibilities that could range from somebody responsible for project management for a particular solar installation and you might have another manager who is working on the production line (...) producing PV Cells who have totally different requirements in terms of training. So to offer them a broad module called solar power is a mistake because there is too much material involved in that module that doesn't relate to their work.'

The goals were:

- To identify and define the needs of distance learners within the renewable energy industry
- To help them to attain specific competencies
- To provide them with appropriate material to fulfil those needs
- To deliver those materials in an appropriate format

Therefore, what was previously the content for a whole module was divided into individual units, and each unit covers approximately one or two lectures. There could only be limited pre-requisites from unit to unit as opposed to the current traditional syllabus format.

'But that's not so difficult because lecturers, individual academics, don't usually rely on work that's been done by other academics in their lectures, to underpin their own. So you'll see that, for instance, introduction to photovoltaics and photovoltaics systems, SP-05 and -07 generally stand alone within a module as does solar collector and as does the resource. So we have an opportunity to ask industry folk to rank, give these individual units a topic, and based on my own experience in working with people in industry I can almost estimate what the profile would be for a given employee but we can't assume that. We must go to the employee and get the data'.

(Interviewee n° 3)

The main goal was to re-establish the structure of the existing syllabus to be a more student-centred format, so that each individual could have a different learning programme. As far as the methods of delivery are concerned, there have been discussions on how to make the decision about the system by which those delivery methods are achieved; and to make the method of delivery and the content levels appropriate for each individual student. The long term aim is to produce a Master's programme and make it available to the public over a period of three years starting with only one accredited module, and therefore, to make it possible to define a procedure by which the administrative and workload on academic staff can be minimized. Setting up a Master's programme would require a number of formal procedures to get it accredited through the committees and through the Associate Dean for

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8.1 i.e. Less than 250 employees across the UK.
Teaching (ADT). After having acquired approval through these formal procedures, the programme can be used as a model subsequently for the roll out of all other modules and eventually to be able to get the ISO (International Standards Organization) certification. 'We want to have the quality assurance certificate for this whole procedure so if you don’t address this early on it’s much more difficult to get those certifications' (Interviewee n° 3).

Issues considered during the advanced stages of planning this DE programme

Some of the issues foreseen, have been discussed in a previous section:

- To use a student-centred approach
- To meet the individual needs of the students within each target group
- To design the appropriate syllabus based on those needs

These issues were important because the programme had to be dynamic and flexible enough to be adjusted to meet the individual needs of the students. 'It’s the same as a car, if it’s not suited to the needs of your target group, then no-one will buy it', remarked the interviewee.

Policy: One of the problems foreseen and revealed during the interview referred to the educational policy for DE. The whole DE programme has been driven from the bottom, from the individual and isolated projects within the University.

'It is better in a structure such as a university or corporation to have well informed leadership who know the aspects, factors involved and so can impose from above a procedure which is well thought through and tested. Distance learning is a difficult one though because it’s so young and there are only a few people in the national academia, at a senior management level who have had experience in setting policy. So you either have to drive it from the bottom of the projects, which has a high risk factor, or you bring someone in from outside such as a management consultant. This consultant can mould, design a specific procedure for your university and universities are not keen to do that kind of thing'.

(Interviewee n° 3)

These issues have been addressed by working with internal stakeholders which include the Computing Services, the Engineering Teaching and Learning Support Centre, the Learning and Teaching Development team, and using the whole team’s experience and expertise in both academic and industrial settings. This is because there is a wide range of skills needed to develop an initial structure by which the programme can be successfully completed. Thus, at the time of the case study, results were being evaluated on an on-going basis, i.e. an iterative process. Some of the issues identified and revealed during the interview were:

Group dynamics: The group dynamics of the DE cohort of students were extremely different. One of the crucial skills that needs further development was moderation or facilitation to support effective group dynamics, and to encourage students to take part in an on-line discussion. Important aspects of this issue were:

- How to form groups at a distance
- How to meaningfully communicate
- How to have a sense of community

'But that’s pedagogy which hasn’t developed very far yet and the media is extremely young for the students to comprehend. So for instance, we have a situation where I can see how many times each student logs on to the Web site but a very small proportion of those students makes a comment in a discussion forum. (...) These students are logging on, and I’m sure they are doing the work themselves, but they are not interacting and not creating the dynamics'.

(Interviewee n° 3, 2001)

One of the strategies adopted to overcome this issue was to be as prescriptive and guiding as possible in the task that the students are asked to perform. 'To give them an open-ended task (...) may be too open for some of them to tackle', so being as specific as possible was also important. Another strategy to involve them was to arrange face-to-face seminars to get them to meet, and a chat-seminar with a professor who goes on-line to talk to students synchronously, so that human contact, which is crucial in motivating students, can be established.

Value/perception: Another problem highlighted by the interviewee was that students are not paying for this course, because the programme has been subsidised by the European Union. '(...) You might think that it’s an
advantage but it isn’t because if someone doesn’t pay for something, they don’t value it’. In the future, each one of these units will cost in the order of £100.00 so that it could change the perceptions of the students as far as value is concerned. Then they will ‘make sure to get the most out of it’, remarked the interviewee.

'We have to produce a programme which, from the corporate sector, is seen as high quality, and that goes where there is a Master’s programme or professional development or whatever. However, if they see something that they are getting for free, they see it in a lower quality light, because it’s free (...). Low priority perhaps is a better word than quality. However we need our students for this particular project to spend X number of hours studying because their time is counted as matching funding to the European Union. So the money that they give us is measured against the amount of time that the students spend studying. So it’s very important that we retain and involve these students as much as possible'.

Resources: This programme presents features that place it far ahead of the previous sub-case studies in the planning stage. As such, this programme has personnel resources like the project manager (the interviewee n° 3), a full-time courseware developer, support staff from the Computing Services (e.g. the editor). The editor is responsible for obtaining and editing content. For example, there are a number of technical authors who add materials to the Web, sort materials which are appropriate for the course and author it ‘from scratch’, where there are gaps. Then the editor pulls that together and deals with issues such as ‘look and feel’, documentation, and fittings. These correspond to 3.2 FTE (full-time equivalent) staff and the budget for these was around £100,000 for a year. The project manager needs Web programmers and Web designers to be used on an as-needed basis.

'Courseware development is very front-end loaded in that you’ll spend a lot of intense work at the beginning putting these applications together and then they become less important as you deliver the course because their products have already been developed. Facilitator and project officer or, if you like, or co-ordinator roles are much more real-end loaded in that their jobs become more important as the course runs'.

Structure of the resource management: The manager was particularly concerned with the existing structure and is adopting a rather different structure in his future programme so that it can be more efficient due to the very commercial nature of the programme. He explains that:

'These projects are very horizontally structured, you need skills and if you take one of those skills out the whole project collapses. It’s much more difficult, you have a lot of people on the horizontal structure with skills that need to come together to produce this topic, this product. Whereas, that is not typical for universities which are very vertically oriented, I mean that you have a senior lecturer or a professor, who has a research project, they employ one single person full-time to deliver that project, because the professor has all the skills required to manage everything that is required to make a project come together. That’s very vertically aligned (...). But this project means being a much more commercial, co-operative, corporate as well, because this whole project and approach is geared to delivering a corporate star product to people who are in work. So if you don’t deliver corporate level service, in terms of the time scale and the quality, and the look, the AVS (Audio Visual Service), are important in this project, unless you can do that, then you’re not going to be successful or as successful as you could, working on a more commercial basis.'

Pay back time: Another concern was related to the pay back time as he states:

'I don’t know what the pay back time will be for this. It’s very interesting, until you know what the profit margins are for a particular institution because it’s not cheaper to deliver education like this, that’s why you need upfront funding, that’s why the EU and EPSRC are providing these kinds of up front development grants, (...) so that these kinds of project are in terms of funding, front-end loaded again, and literally require a huge up front investment in comparison to some research projects, for instance, you know, they have to be taken on a case by case basis.'

Sub-case study D4

The Centre for Hazard and Risk Management (CHARM) of the Business School provided the setting for this sub-case study (D4) because of the stage of its current DE programme. Although, this programme is paper-based, the interviewee (n° 4), who was the manager of the programme, expressed his intention to convert part of the programme into an electronic format. This was particularly interesting because it provided an insight into the kind of issues this transition requires. Another specific feature of this programme is that in its current format it has been running for nearly 20 years. It delivers a course on Security Management totally at a distance to 112 working students. The programme offers a postgraduate certificate, diploma and Master’s degree. Most of these students do not hold a degree, they come from a variety of backgrounds: security, prison services, military, and police. As such,
the interviewee highlighted that it had been quite challenging to deliver a course totally at a distance to people who are in industry and have no formal higher educational background at the same time keeping the drop out rate as low as 10%.

'The reason people give for that is usually associated with their work (...) they've been promoted and it's no longer of any value to them, they have moved on to a different section, or they have reported domestic problems, you know. Often these people work around families, they've got all sort of problems because they are not on campus, but very few just drop out for the sake of it'.

(Interviewee n° 4, 2001)

Moreover, students are globally dispersed, including: Macau, Hong Kong, South Africa, Congo, the Bahamas, Bermudas, Cameroon, Alaska, USA, Holland, Germany, France, and Ireland.

Aims of the DE programme Security Management

When this programme was set up in 1983, it was the only taught Diploma course and students had to come to campus for two weeks per module and then they would do the assignments at home. After that, the students would return for two weeks for another module so it was a combination of traditional campus-based classes with independent work. After a first trial, there was a recognized inability to maintain the application rate because employees were finding it difficult to be released by their bosses for the two-week classes on campus on an intermittent basis. In 1994 it was decided to convert the two-week campus-based classes into a DE format so that students would no longer be required to attend lectures on campus and they could keep their jobs and career progressions. The organizations are currently financing a vast majority of their employees' studies, which costs £2,800 for the certificate, £3,800 for the Diploma and £4,800 for the Master's degree. Currently, the programme intends to expand by attracting interest from ethnic minority groups and female professionals.

Besides the intention to make use of more electronic format materials rather than only paper-based material, one of the aims of this DE programme is to increase the security professional's esteem. That aim was attained by enabling them to think about the different ways a problem can be solved so that the best action can be taken. The reason for that 'is because security as a profession, if you like, is regarded as the dead end of all jobs' remarked the interviewee. Therefore the programme is intended to raise their profile and increase their self-respect. This can add value to organizations, and increase awareness of safety and management issues.

The main aim at the moment is to update all the material, which was originally written for the campus-based classes some years ago. These materials require constant updating and thus re-writing. Another intention of the programme, perhaps with less priority than updating the existing course, is to release a second course at a distance in Investigation. It has been developed and is currently going through part of the formal process for approval and accreditation.

Issues in the process of converting an existing partially DE course to a totally DE programme

**Entrance requirements:** At a British university, the official entrance requirements include a number of "A" levels or equivalent qualifications by the prospective students. However, this programme is designed for a completely different clientele:

'They were missing the fact that most of the people in security will not have these qualifications because perhaps they went into the armed forces at seventeen, they've got army qualifications but haven't got any "A" levels, and you are losing a whole sector. So they introduce the certificate as a step to the diploma. So people (...) start off with the certificate, get reasonable marks on it, (...) and then they decided well we are now going to the diploma. We've got plenty of students who are ambitious and we actually will now move it ahead on to full Masters and the way through all the University protocols and the various committees and they've got approval for it (...).' 

**Access to computers:** During the interview, it was revealed that, due to a diverse variety of backgrounds and the nature of their work, students find it difficult to gain access to computers because of the lack of availability of computers at their job facilities. The interviewee reported: 'It's quite interesting, you know, they end up having to give a hand written assignment to somebody to do the work of typing it before they send it on to us'. However, that appears to be not only due to lack of availability of computers at work but also lack of basic IT skills due to students being dispersed around the world.
Ensuring students’ learning: One of the aspects that needs consideration when a DE programme does not include any element of traditional teaching (face-to-face), is the issue of ensuring students’ learning. In other words, the question here is: ‘how to ensure that the students are actually writing assignments by themselves and therefore learning independently?’ One of the ways of overcoming it was to appoint a work-based advisor, from within the organization who acts as a mentor. The interviewee explained:

'We want that person to review the work before it comes to us. That’s the only way we can avoid cheating, because theoretically and practically, somebody can register on a course with us, go through the whole course, come out the other end with a degree, a certificate or a diploma and you never see them'.

Updating material/Overload: The process of converting all the material into an updated version so that students can learn more independently (e.g. DE format), is quite laborious and time-consuming for a single staff member, i.e. the programme manager who also does all the marking. Moreover, because the programme is self-financing, it could not afford to pay staff to do some of these tasks. However, the programme is paper-based and will remain so for the DE course.

Legislation/Regulation in security: Moreover, being a worldwide programme with students in several parts of the world, this programme revealed the rather specific issue of legislation and regulation. The interviewee was asked the following question: 'You mentioned that you have to write and update the material because of new legislation, etc... When you do that, do you follow the English legislation? If so, how do you address the issue of students located in other countries, under a different legislation?' ‘That’s a great question. I tell you what we exactly do and that irritates me no end. We follow the English legislation’. This issue was overcome by avoiding posting questions relating to the English legislation as he explains: 'So what we are trying to do is, we are trying to give them a question within a module that does not relate to English legislation, particularly in some of the modules.'

Students’ communication: Being a course totally delivered at a distance, students’ communication was an important issue. In order to overcome lack of communication, the programme has adopted the following approach. For each group of students within the same organization, one of these students is selected to be a course representative. This student is responsible for establishing communication between the group and the programme manager. Furthermore, his or her role is to keep other students informed about eventual communication from the manager. He or she needs to maintain a certain level of communication flow by e-mail or telephone and thus encourage participation in the self-help network.

Resources: Currently, the programme has the programme manager who runs the course, writes the material for every module and does the marking. There is another lecturer who does the second marking. Due to work overload, the manager would like to afford a new member of staff to help with all these tasks, but paying more staff is problematic for a self-financing programme. The Director of CHARM has plans to expand the course offerings and hence acquire more students, and as a result obtain more income to pay new staff members. The course has a policy to send every final student’s assignments to an external examiner. Students have an external advisor, from their own organization, who guides their work and reviews it before it can be submitted. Unlike the external advisor, the external examiner is external to the whole process, to the University and to the organization. The examiners are paid by the programme. According to the manager, these provide a fair system, particularly to students.

Sub-case study D5

The Department of Chemistry provided the setting for this sub-case study (D5) because the programme organizer, who was interviewee n° 5, is currently planning a dual mode programme, a combination of traditional campus-based teaching with modules taught at a distance. The programme organizer is planning the programme with other members of staff but she is actually responsible for the original proposal to the EPSRC. This programme is an MSc in Analytical and Pharmaceutical Sciences and thus is being planned and developed for professionals who work in the pharmaceutical industry and seek job promotion by acquiring an MSc degree without having to leave their jobs. The dual structure of this programme encompasses a phase of self-learning through CAL (Computer Aided Learning) materials that will be available on the Internet to all the registered students and a three-day course on campus. All the material and course content will be delivered through the Internet, particularly the University’s Learn Server. The programme has funding from the government body (EPSRC) which is part of a scheme called the Master’s Training Packages and according to the organizer: 'It just happens to include some self-learning and distance learning allowances'. At this stage, the programme organizer appears to have made a number of important decisions and plans for further developments, particularly concerning the dual structure of the programme, the
sylabus, the delivery method, the relationship with the organizations that will release their employees for their studies as well as the promotional material. However, this programme is in its advanced stages of planning because it will be launched a few months after this study.

Aims of the DE programme in Analytical and Pharmaceutical Sciences

This programme is being developed to replace two existing traditional MSc courses: Analytical Chemistry, and Medicinal Chemistry and Drug Metabolism. Hence, the main objective is to enable professional people in industry to enrol in the course that traditionally (face-to-face) would take one year providing that the students would be studying full-time which requires leaving their job or studying part-time and travelling to campus once a week for two years. With this new programme, professional students can take up to five years with the convenience of not being required to attend regular classes on campus. Another benefit is that the programme offers flexibility regarding the syllabus. The interviewee explained:

'Flexibility, that's the idea, to have a flexible structure so that they could just do modules that are appropriate to them [depending on their field and job requirements] and they would have only to be at the University for three days. Rather than, at the moment, we have done the Analytical Chemistry course as a part-time course, but they have to attend classes on campus every Friday for two years'.

Relationship with industries: The reason for targeting people in industry was that the organizer has contact with quite a few industries that helped to develop the programme, in particular its structure and the design of a syllabus that would be suitable. The interviewee exemplifies: 'For example, the drug presentation, packaging [...] they [the industry] thought that was very important and we hadn't really considered that sort of thing (...). So we put that in, for the pharmaceutical industry, that is an important area'. Because of this active relationship with industry, one of the aims is to have people from these industries coming to campus for the three-day short courses to give seminars, lectures, and workshops. The interviewee (n°5) reported the following: 'So we are having direct input from industry. We will also have some visits to industries too. So there will be quite a bit of two-way co-operation'. Because these industries will directly benefit from the knowledge their employees will acquire with the programme, they are donating equipment, time with personnel, and lecturers (from within these industries). As the interviewee explained: 'They come for free and they will show us around their company. It's really donations in kind rather than in money donations'. Moreover, an important part of this programme is that students are required to do a three-month project in industry and they will be placed in industry so that a person within the industry will supervise their projects. This person will not be paid by the programme, but will be part of the donation, since they expect that the project would be useful for the industry. 'So they hope to get something out of the project' said the interviewee.

'Marketing: During the interview, the organizer mentioned that the promotion material for marketing the programme was being developed, including the Web and paper-based brochures of the course.

Decisions being made

Having decided on the delivery tool, the Internet, the organizer is making more specific technical decisions including:

- Computer platform requirement (hardware and software)
- Whether to adopt PowerPoint
- Whether to deliver some of the material in CD-ROM format

'So we need to make decisions about the technology. It may be that we decide to put material on the Web. It may just guide people to books or to journals. They may then go and look up the material themselves or we may send some of the material out in CD-ROMs, for example, the CAL package that they have access to on campus but is not easy to access off campus. I understand that we can make a copy on CD-ROM and send it to students who are at a distance.' (Interviewee n°5, 2001)

- Whether to provide support through e-mail
- Whether to use the discussion group for support over the Internet
Accreditation: Accreditation would be quite a long formal process, nevertheless, the goal is to get the programme accredited, firstly by the University's committee. However, the University's policies do not provide credit for individual modules. It only provides credit to students registered on an entire programme or course. Secondly, the interviewee reported: 'But also we do want to get external accreditation by the Royal Society of Chemistry which means that an outside body will have said that this course is of quality and approved'.

Time release: The organizer hopes that as soon as the industries realize that they will benefit, they will release time for their employees to study. Otherwise, the employees would have to be taking the course in the evenings and weekends perhaps on their personal computers. In fact, there are two aspects that concern the organizer, the distance learning phase in which the students would be learning independently through the Internet and getting students released to go to the University for the three-day courses:

'I think that they would release them to come to the University for the short course, but I'm not sure whether they would give them a lot of time during working hours to be surfing the Web (...) so time will tell. Also a lot of companies have security systems which mean that employees can't look at the Internet freely and, sometimes they can't actually access the Internet from work so there might be a technical reason why they can't do it at work. That's another aspect we need to look into. It depends on who applies to the course, what companies they work for really.'

(Interviewee n° 5, 2001)

Students' assessment: Since part of the programme is composed of lectures at a distance and the self-learning phase, the organizer expressed concerns relating to the students' assessment. Moreover, the organizer was particularly concerned with a way of ensuring that the industry students would be doing the self-learning tasks when at a distance and so would not be losing contact with the programme. The interviewee explains:

'To get them to do some self-learning rather than lecturers having to lecture everything, we will have a test on the self-learn. When it comes to the short courses, they will have a test on the self-learning phase to make sure that they have done it. Because the problem with self-learning is that students won't do it. They will come to the short courses and think 'oh well, I can catch up but that won't be so easy because we will give them a test which will count towards the mark'.

At the moment, this test is being planned as a multiple-choice test. According to the interviewee, it would be appropriate to have it done electronically but that will depend on the Internet tool chosen.

Requirements to the overseas students: Overseas students will be able to enrol in the programme, however, they would be required to move and live nearby so that they can access all CAL packages from the computers on campus or from their dormitories on campus and would also attend the three-day lectures on campus. On the other hand, they could be full-time students who would complete their Masters course in one year as opposed to the distant students from industry who would be able to complete in five years. The interviewee anticipates the programme might not receive many applications from industry for the first year. She suspects that the programme will start with more full-time students and as the course evolves, they will increasingly receive more applications from industry students.

Resources: As far as personnel resources are concerned, the programme has three academic staff, including the interviewee who also has the role of the internal examiner. Each lecturer will be responsible for two or three modules and it is each lecturer's responsibility:

- To be in charge of the delivery of those modules
- To gather all the necessary information and course content
- To organize them in a DE format, and
- To submit any information that they want to be included in the University's Learn Server

There is also the programme development officer who will be involved in putting the materials onto the Internet. Currently, the programme is in the process of appointing a new staff member to work on a full-time basis. The responsibility of this officer will be to manage the programme and the post will be funded by the EPSRC. The officer's responsibilities will include:
To search for any relevant material commercially available, and
To make them available to the students

'This would be somebody who would be in charge of putting the materials onto the Web. They wouldn't write all
the material, they might write some of it but the materials would be written by the individual academic staff
members. They would then pass them through to this person who would edit and put onto the Web in a suitable
form and they would manage the delivery of that. They would also have to organize the short courses. So that's
the sort of the planning. We have done quite a bit of planning in terms of producing advertising materials (...)'.

(Interviewee n² 5, 2001)

Moreover, there is a third member of academic staff who is administering another MSc programme, in
Environmental Sciences, nevertheless, this person is working on the organization of student registrations, putting
materials on the Chemistry Department's Web site, advertisement material such as the brochure and so forth. These
are the three staff members who are directly involved in the organization of the programme, which includes the
programme organizer herself. They are also involved in submitting the proposal to the University. Furthermore, there
are other members of staff who will be involved in writing notes and any other relevant information that they want to
be included on the server for the self-learning phase. However, this will not require a great deal of laborious work as
in some of the earlier sub-case studies, because the new DE programme is replacing two current courses. Thus, part
of the material has already been written. Therefore, most of the work with the course content will be adapting what
was written for the current programme to a DE format. Fortunately, most of these materials were already written in
an electronic format because:

'(...) These days a lot of lecturers have their lectures as PowerPoint files or Word files. So it's easier than it would
have been ten years ago. There is a lot of information that is already there. So it's a question of just collating this
material putting it into the right modules because the modules have changes in their content. For example, in the
current Analytical Chemistry course we have four 30-credit modules as part of that course. Now the new course
will be nearly all ten-credit modules, some 20's, so there will be in smaller packages again so that industry can
pick those bits that they want, rather then having to do the full 30-credit at a time.'

(Interviewee n² 5, 2001)

Sub-case study D6

The IPTME (The Institute of Polymer Technology and Materials Engineering) in the Faculty of Sciences
provided an interesting setting for conducting sub-case study D6 because its DE programme was being planned at the
time of this survey. This DE programme is in Materials for Industry and it is being funded by the EPSRC through a
five-year grant. The programme targets professionals who work in industry and seek to further their knowledge and
practices about the subject of materials without having to leave their job. 'They like their salary but they want to
continue their education (...) once people are working, once people get a salary, they don't want to go back to being
students', reported interviewee n² 6 who was the programme manager and is currently responsible for every aspect
of it. In fact, he is responsible for the entire postgraduate teaching within IPTME. The programme offers a
Postgraduate Certificate, and a Postgraduate Diploma, and its manager is planning to offer a Master's degree. The
structure of this programme is very similar to the ones presented before as far as having a combination of two modes
delivery (sub-case studies D3 and D5). The dual structure of this programme encompasses a total of about 30
modules under which half will be available in a DE format. The remaining half will be taught in a one-week campus-

based format where students would have to go to the University for an intensive course before they go back to their
homes. 'To a large extent, they can pick what modules they want as a free choice', depending on the appropriateness
of the course content and the popularity of the module as far as industries are concerned. The interviewee explained:

'We are taking a more commercial direction on this (...) we've identified those modules that we feel we can sell as
a one-week module in its own right and those are being taught in a one-week format. Those modules we thought
would be less popular to be taught in that format will be taught at a distance learning format'.

Aims of the DE programme in Materials for Industry

The current number of students who take material as a subject matter at the University is relatively small
considering the demands of the market. Across the UK, there might be not much more than a hundred students a year
graduating in Materials and yet 'Materials underpin absolutely everything', reported interviewee n² 6.
'If you look around any room, everything is a material, the wood, the chairs, the desks, light fittings, the windows - everything is a material. Even people can be considered as materials because as we all get older, bits wear out, so artificial bones, artificial teeth, artificial skin, these are all materials. So everything is a material and yet we have very few material specialists in the country. So what happens, there is a demand from industry but very little demand from students. Because students on a whole don't know about materials, what we get is a situation in industry where people who have a degree perhaps in chemistry, physics, mechanical engineering or manufacturing engineering and find, over time, that their job becomes more materials oriented. They need to know more about materials. What we are trying to do is to provide them with that knowledge.'

**Target group:** In the planning stage, the programme manager has developed the overall structure of the programme. Particularly, he and other members of the academic staff, i.e. lecturers and professors, are developing and producing the syllabus, and the content of each module. Most of the main decisions were made before the programme manager took over the task of turning the project into a reality. For example, as far as decisions about the target group was concerned, it was decided to aim the programme at industrial people rather than at people who perhaps are Materials students wishing to further advance their knowledge and skills.

**Decisions being made**

**Delivery method:** At this stage, the manager and other members of the academic staff have decided to make use of books, i.e. paper-based materials, as a main method of delivering their DE course content to the students. According to the interviewee, there is an intention to start making use of more electronic materials and the Internet as a delivery system, however, the interviewee explained:

'(...) What we are going to do is move at it [DE] slowly as I said, one step at a time, books first, then CD, which will take us three or four years from now, then, we can re-evaluate and say we do want the Web or we don't want the Web.'

**Approval and accreditation:** After having received a government grant, and having decided on the delivery method, the manager is trying to get the whole programme approved by the University's authorities. At this stage the manager is not discussing accrediting as this will be addressed in the future, in approximately six months time. For this reason, the manager and other staff members are currently making decisions about the content of each module.

**Syllabus:** In order to get the programme approved by the University, the programme has to be well defined. As such, the detailed content of each module is being prepared and decisions are being made to tailor the programme structure to the interests and needs of industry students. It was decided that there would be 30 or more modules. However, some of them already exist in the established Master's programme so the others have to be specified and developed. The issue of the general structure of the syllabus was discussed with the industry panel and decisions about how to deal with that was taken. The interview excerpt below illustrates this issue:

'Would industry be willing to let their people disappear for a week at a time? Would they be willing to pay? Not only would they have to pay for the course but while the students are here for the one-week course, they have to pay for their hotel, they have to pay for their travel costs and so forth. And again, the decisions were taken having talked to industry, having interfaced with industry and discussed with them. So really, how the issues have been addressed, I would say this in conclusion, we discuss things with industry and see what they have to say, but we make our own decisions at the end of the day. We take responsibility'.

**Allocation of staff members:** One of the decisions being made is to decide how the EPSRC funding, which is for five years, is going to be spent. The manager is making decisions regarding the allocation of staff members for tasks such as converting existing modules. Such modules were written for the standard University format (i.e. a semester long format, 1-2 hours a week) into a dual mode format (i.e. combination of traditional with distance education format). However, decisions are also dependent on the University's decisions on allowing the employment of new staff members.

**Issues**

**Awareness among prospective students:** Although it does not relate to DE, this issue provides underlying understanding of this sub-case study because it is one of the major issues according to the interviewee. This issue is about the lack of awareness among the prospective students of the importance of taking a degree in Materials. According to the interviewee, 17-18 year old students are not always aware of the existence of a course in Materials. As such, few students are interested in taking a first degree in Materials and, as a consequence, the number of
enrolments in Materials is dropping. Engineering, in general, as a field, is getting fewer and fewer enrolments, and Engineering Departments in the UK, in the US and in Australia are being forced to close. However, according to the interviewee, industry's demand for competence and skills of people educated in Materials is increasing. Therefore, as an attempt to fill this gap, the issue of increasing awareness among 17-18 year old prospective students is as crucial as delivering a DE course in Materials for people in industry who do not necessarily possess a degree in Materials.

**Relationship with industries:** There is a concern about maintaining a good quality course for industry so that they will guarantee a certain number of employees taking the course. According to the interviewee, at the moment, industries are sending only one employee as a trial. 'They want to know: “is it a good course?”(...) Then they will send more people, but at the moment they are being more cautious. Of course, we might not have a good course, as far as they are concerned' (interviewee nº 6, 2001). At first, industry's attitude is cautious because a typical student will spend approximately 4-6 weeks a year which does not appear much but during this time the employee is not working so the industry has to be certain that it is worthwhile because it costs them. The interview excerpt below illustrates this issue:

'So the company will pay the fees, the company will do all that. So the company makes the choice as to whether the student comes or not. Also part of the structure is for students to have to do a research project. That research project will usually happen within the company and for that we will expect the student to have someone as a supervisor within the company who will usually be the student's boss. And so while the student will interface or will talk to us at the University on a day to day basis, because they are doing this research in their company, they will need their bosses or someone who can help, make sure that they are doing a good job. So there will definitely be a role for the company within the overall structure of the programme'.

**Security and illegal duplication:** Another issue revealed during the interview was about how to ensure that all the material is not going to be duplicated by one company employee and be passed on to other employees or even other industries.

'Because we hope to attract students from overseas, not just UK students (...). In which case, all what is needed is one company to send one student and then that student goes back with all the material that can be duplicated after and so forth. So we've got to think about the security aspects of this'.

This could lead to a significant drop in the numbers of applications so the interviewee was quite concerned about it. However, he had already explained a possible solution for preventing illegal duplication of paper-based materials:

'(...) One of the things that the Open University did, for example, with its later materials is that some of the materials are presented in the books, which are published with ink colours that do not photocopy well. You know, little things like that can make a big difference so that people are less likely to just photocopy. So there are a few little tricks which don't take much effort, but help'.

At this stage during the interview, a comment was made about the role of the lecturer for not only planning, writing and delivering the material, but also supporting students academically. This comment was then followed by a question:

'Because, in practice, you could potentially photocopy a whole book, and so many books from a prestigious course, from a prestigious university, but what about the role of the lecturer? And the academic support staff which I suppose cannot be duplicated, only the materials that are published, either on a book or on the Web. However, the knowledge and role of a lecturer cannot be duplicated, so what is your view on this aspect?'

'That's right. This is true, I mean there is no argument. That is true. But on the other hand with distance learning materials especially, they are very much designed so that the students can understand it without having to have much support. I mean, certainly with the Open University for example, you only saw the students maybe twice a year, so the way in which the material was presented was deliberately, extremely clear to minimize the amount of tutorial support and so forth that the students need.'

Examining his answer gave a sense of diminishing the important role of the lecturer in DE. The importance of the lecturer's role in DE is well discussed and defended among DE practitioners. Thus diminishing it represents another model of DE, which is well established by the UKOU. However, this model appears to work well in training of skills e.g. IT (e.g. chapter 4) but not in teaching knowledge and skills for Higher Education or Further Education students. Another comment by the manager that supports this view was: 'Also of course, every distance learning
course is slightly less effort for us to have to teach because it's something that the student largely does on their own with some support rather than us having to teach it'.

Resources: Decisions are being made about the overall structure of the whole programme so that it can be submitted for approval by the University's authorities. As mentioned earlier, one of the decisions is about how to spend the grant of £ 390,000 over a five-year period, which includes hiring staff members. Therefore, at the moment, decisions are being made about hiring a member of staff to administer the programme, this person will be responsible for the day-to-day running of individual modules. At this stage there seems to be a certain level of uncertainty about the number of staff necessary but there will probably be another member of staff to write material for the one-week course which is in DE format. The third resource needed is staff whose roles and responsibilities will be to market the programme. However, the manager is looking for a single person for these three roles and responsibilities. The manager explains:

'(...) One resource we need very much is someone with distance learning expertise who knows how to write a really good distance learning book. I have certain knowledge but not enough to be able to produce it. So this is one person that we are looking for at the moment, but we need more than just that. We need the same person also to have skills because a big role is getting students. Now, these students, at the moment, they are not eighteen years old, they are not looking to come to the university. Most of them who will come, if we ask them today, they would not even have thought of the possibility. Because they don't know the course exists. So we need therefore to get someone to go out there and market it. They would go round the companies. They would not be based in an office on campus. They will have an office, but two days a week, three days a week, they will be out there travelling, visiting companies, explaining the programme, getting them interested, getting them to want to put students on it (...). Now what we need is a person, there are two people that we are advertising for: an administrator who is a distance learning specialist and also this industrial marketer. That will be one person with all these skills. Is quite a difficult job to find someone'.

Sub-case study D7

This is a different sub-case study, in that this is not a case of a DE programme being planned, rather this section outlines the survey with the person who is responsible for setting up a policy for DE initiatives in this University. Having a key role in supporting DE initiatives, gave her the grant award from a government body to carry out this major responsibility for a two-year period. One of her major roles is to encourage communication among the staff members of the University who are designing DE initiatives. Some of them are the managers surveyed in this study. By generating communication among them, she is also encouraging a self-learning group that exchanges experiences in order to learn and make effective progress in DE initiatives. She has set up several workshops on various aspects of DE and these have generated an amount of helpful information about their experiences with planning, designing, managing and delivering DE. Because she is a central person in DE initiatives in this University, the survey with her was extremely helpful. She rated almost all the issues from the questionnaire as being very important. Furthermore, after the interview, a few issues emerged as being suitable additions to the framework:

- Support for disabled and special needs students
- Career support
- Study and learning skills support

Support for disabled and special needs students appears to be an important issue, as there will be applications from people with this profile that should not be excluded from the same opportunities as the ones offered to other students. As far as career support is concerned, the counselling support previously included in the framework was thought to have this role as well, especially for the young and less mature students. Another issue which emerged from the interview was study and learning skills support which is very important for the less experienced and young students and those who suffer from a lack of enough confidence. The next section presents the results of the questionnaire survey. Following each interview, each person was asked to complete a questionnaire to judge the importance of a range of issues drawn from the frameworks presented in the previous chapter (7).
8.6 Results

This section outlines the results of the Likert-type questionnaire administered to the manager of each DE programme (sub-case studies). The questionnaire was built strictly following the frameworks reported in the previous chapter. These frameworks were the result of an in-depth analysis of three case studies (A, B, and C) and a relevant literature review. Thirteen charts were constructed to illustrate the results, provide an understanding of the degree of importance for each issue, and a descriptive analysis follows to present, when in the planning stage, these issues arise.

a) Information about the students

![Figure 8.3: Information about the students - Characteristics](image)

Figure 8.3 illustrates clearly the important characteristics of the students that deserve consideration when planning DE programmes. These were rated by the managers who were directly involved in the process of planning DE programmes. They were: English skills entrance level for the students whose first language is not English, whether the students would take the DE course on a full-time or part-time basis, and whether they work or not. These factors were rated as being important. They help to understand: the audience to be sought, how to develop an adequate material and an appropriate syllabus, how to plan an adequate form of financing (e.g. "if students are not working, they have to pay"), the importance of time management issues and career progression. In contrast, gender and marital status were not considered as being important.
8.6 Results

This section outlines the results of the Likert-type questionnaire administered to the manager of each DE programme (sub-case studies). The questionnaire was built strictly following the frameworks reported in the previous chapter. These frameworks were the result of an in-depth analysis of three case studies (A, B, and C) and a relevant literature review. Thirteen charts were constructed to illustrate the results, provide an understanding of the degree of importance for each issue, and a descriptive analysis follows to present, when in the planning stage, these issues arise.

a) Information about the students

![Figure 8.3: Information about the students - Characteristics](image)

Figure 8.3 illustrates clearly the important characteristics of the students that deserve consideration when planning DE programmes. These were rated by the managers who were directly involved in the process of planning DE programmes. They were: English skills entrance level for the students whose first language is not English, whether the students would take the DE course on a full-time or part-time basis, and whether they work or not. These factors were rated as being important. They help to understand: the audience to be sought, how to develop an adequate material and an appropriate syllabus, how to plan an adequate form of financing (e.g. "if students are not working, they have to pay"), the importance of time management issues and career progression. In contrast, gender and marital status were not considered as being important.
As far as students' backgrounds were concerned, social background was not considered to be important when planning DE programmes. Although educational background was important, economic and cultural backgrounds as well as previous experience with DE were rated as only being somewhat important. According to the manager's ratings, the most important factors besides educational background, were: individual needs, ambitions, expectations, interests and main site of instruction. Moreover, previous experience with DE was rated as being neutral. Although it should not be an entrance requirement, it would certainly be a positive aspect.

b) Access to infrastructure

Access to infrastructure was divided into services and resources. Figure 8.5 clearly illustrates that all services available in the original framework (chapter 7) were rated as being important or somewhat important by the DE programmes' managers. The least important of these services was counselling, although it was still somewhat important. No explanation was given by the managers for this result, nevertheless, given the fact that most of the students of the DE programmes being planned would have been mature professionals, it is assumed that they have gone through counselling at some stage before.
Access to resources such as equipment and on-line libraries were both rated as being important. Students on campus would have easy access to the entire infrastructure available. In order to provide the same opportunities for the distant students, it is vital that extra effort should be given to planning ways of offering these resources to the distant students as well.

c) Choice of appropriate technology

As far as choosing the appropriate technology is concerned, communication has always been one of the most critical aspects of DE. As such, choosing the appropriate technology deserves careful consideration. Figure 8.7 shows that all three kinds of communication were rated as being important.
As far as choosing the appropriate technology for instruction is concerned, lecture and group work were not rated as being very important, rather the average score values were nearly neutral. This is due to the fact that most of the DE programme planning surveyed was being structured for dual mode delivery. Hence, instruction formats such as lecture and group work activities are more appropriately delivered in a face-to-face format which would not have to rely on a particular technology.

Not surprisingly, the managers surveyed considered choosing the appropriate technology for delivery of content and students' assignments to be important.
The results reveal that choosing the appropriate technology for social support was rated as being neutral. However, choosing it for technical, for administrative and for English support was considered important. This is probably because social support is more appropriately done via face-to-face personal interaction which does not rely on the use of a particular technology.

As far as evaluation is concerned, it is interesting that the results reveal that the most important kind of evaluation is regarding the students' progress. All the other kinds of evaluation were rated as being important as well. This supports the fact that there are well known electronic tools that are appropriate for evaluating students' progress effectively, but little is known about evaluating quality of instruction, lecturer's teaching and DE programme effectiveness at a distance and via network technologies.
d) Allocation of staff members

Figure 8.12: Allocation of staff members' roles and responsibilities

Figure 8.12 shows that allocation of staff members' roles and responsibilities was considered as being very important for academic support. Although allocation of staff for immediate technical support by a (free) phone line, and for English and counselling support were rated as being neutral. The managers have rated these as neutral because English and counselling areas of support are offered by the University and so there is little need to employ specific staff for these particular roles and for the distant students. Moreover, the issue of a (free) telephone line appears to be complicated due to existing University policy.

e) Face-to-face meetings

Figure 8.13: Face-to-face meeting(s) between lecturers and students – Inducting sessions at the start of the course

Providing social interaction in a face-to-face meeting at the start of the course did not seem to be very important for the managers surveyed, rather it was rated as being somewhat neutral. This is because most of the course structure being planned by the managers were dual mode delivery (i.e. a combination of DE and TE) which means that during the TE modules, it is assumed that there will be opportunities for students to socialize. Introducing
local laboratories was not important because students are expected to use their companies' facilities, although a face-to-face meeting to introduce lecturers and staff members was considered important.

![Setting procedures](image)

**Figure 8.14:** Face-to-face meeting(s) between lecturers and students - Setting procedures

The following three issues were rated as being somewhat important by the managers: face-to-face meetings to set procedures for delivering handouts to students, for delivering assignments to lecturers, and for assessing students' work.

![Making expectations clear](image)

**Figure 8.15:** Face-to-face meeting(s) between lecturers and students - Making expectations clear

Similar to the results presented in figure 8.14, the three issues of face-to-face meetings for making expectations clear from the lecturers, from the students, and from the technicians were rated as being somewhat important by the managers.

### 8.6.1 Summary of results

Sub-case studies D1-6 differ significantly from the earlier case studies carried out (A, B and C), in that they are at diverse stages of the DE planning process, see figure 8.2 at the start of this chapter. Investigating sub-case studies of DE planning provided a number of useful insights and the questionnaire surveys ensured the validity and reliability of the DE planning aid tool, i.e. the conceptual frameworks and models for planning effective DE programmes. Moreover, the interviews revealed that the planning process at this University not only focuses on the
technical aspects but also on the social aspects as well. However, a number of important issues were missed by the managers of the sub-case studies, for example, they intend to rely heavily on the campus services traditionally offered and designed for on-campus students, and use them quite inappropriately for the distant students. This means that they are not committed to taking all the responsibilities necessary to deliver a well-planned and designed DE programme.

Unlike case studies A, B and C, sub-case studies D1-6\(^2\) target mainly professional students working in industry. As far as the DE model is concerned, sub-case studies D1-6 are all cases in which the managers are intending a dual mode delivery. This could be the reason why the interview data analysis revealed that they intend to rely on the campus-based services (such as counselling, English support for non-native speakers whose English skills need extra development, and local libraries), although this is not a reasonable excuse to exclude the design of students services appropriate to the distant students. Appendix E provides five tables from E-1 to E-5 that summarize these results. The next section focuses on a comparison across sub-case studies.

### 8.7 Cross DE programme analysis

Finding out the extent to which the factors were important when planning effective DE programmes through network technologies was critical in determining a structural tool. This tool is intended to guide the process of planning future successful DE programmes with respect to their socio-technical ramifications. However, since there are distinguishing phases within the planning process, an analysis of contrast among the six sub-case studies has become relevant so that important factors and issues can be categorized according to the different phases in which they emerge (or become more relevant) within the planning process. The next paragraphs present the discussion of the cross sub-case study analysis.

As far as information about the students is concerned, results from the tabulated data (see table E-1, appendix E), indicate that during the very early stages of planning a DE programme, the important issues rated by the manager of sub-case study D2 were:

- **Characteristics:** age, number of children (if any), English level (for non-native speakers), full-time/part-time, and working/not working
- **Background:** social, economic, educational, cultural, and familiarity with IT/Internet
- **Individual needs, ambitions, expectations, and interests**

These results reveal that, at a very early stage of planning, it is crucial to get to know the target group, which means that characteristics of the students, background, individual needs, ambitions, expectations, and interests are all important. A similar statement can be made for the results from sub-case study D1. However, age and number of children did not seem to be important for the purpose of planning its DE programme. However, site of instruction was an issue foreseen by sub-case study D1, and it was considered very important due to the attempt to maintain a good relationship with the organizations, in case the main site of instruction turned out to be the organizations.

Without going further with the data analysis, one may be inclined to believe that the more advanced in the planning stage one is, the less important it is to learn about the target population. This is because it is often assumed that it has been learned in the earlier stages of planning. Nevertheless, table E-1 (appendix E) shows that it cannot be as straightforward as this. The reason is that there are other factors (i.e. variables) that affect the importance of the information about the students when planning DE programmes. For example, in sub-case study D4, it was noticed that the manager did not consider students' background to be important, although previous experience with DE was. This was because the DE programme being planned in sub-case study D4, does not offer a degree to start with, which means that it has more flexible entrance requirements. Economic background was not important because most of the students' courses are financed by the companies in which they work. Another contrast revealed by the tabulated data referred to sub-case study D6. The very important aspects of the information about the students for this programmes' plan were whether the students work part-time or full-time and the prospective students' background. This is because this programme is in the field of Materials for Industry, which means that it is not exactly a student-centred but rather an industry-centred model. As a result, individual needs, ambitions, expectations, and interests would apply to the particular industry in which the student work rather than to each student as an

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\(^2\) Sub-case study D7 is not included into this category because as explained earlier in this chapter, this is not a case of DE being planned, rather is a case of setting up a University policy for DE.
individual. Furthermore, another interesting possible assumption is the fact that the target group is bound to be more mature professionals. So age, gender, marital status, and number of children would not matter because it is assumed that at this stage in life, they would know how to manage their time. As opposed to programmes in which students are less mature, and thus less proficient with time management skills.

As far as access to infrastructure is concerned, it was noticed that the more the planning phase advances, the less important some of the issues about accessibility become. These issues are a matter of concern during the early stages of planning the DE programme, but after they have been sorted out, the matter of concern becomes not accessibility but rather how to maintain excellent standards of accessibility for all students. Nevertheless, results in table E-2 (appendix E) indicate that these issues become very important when planning DE for a postgraduate level, as observed in sub-case study D5. This is not surprisingly due to a stronger need to rely on services and resources when students reach this level of education.

By analysing table E-3 (appendix E), it appears that choosing the appropriate technology is not a matter of concern in the very early stages of planning DE. In the early stages of the planning, issues about the appropriate technology for the range of educational tasks starts to be crucial. However, in the very early stages, issues of concern can be quite different, e.g. information about the students. As such, sub-case studies D1, D4 and D3 are the ones in which the managers considered choosing the appropriate technology to be an important issue. Of course, this cannot be analysed in isolation. Sub-case study D2 is at too early a stage to be concerned about it, sub-case study D5 has been making specific decisions about it, and sub-case study D6 is not planning on using DE via network technologies at the moment, but rather it is planning on using paper-based material to start with. This suggests that these issues will be dealt with when the time comes to update the paper-based DE programme to a network technology-based DE. Therefore, beside the level of planning DE programmes, the kind of DE, as far as technology is concerned, is another factor that determines the importance of such issues.

As far as allocation of staff members’ roles and responsibilities is concerned, results from the tabulated data (table E-4 in appendix E) indicate that it was considered to be important in planning DE programmes, particularly for sub-case studies D1, D2, D3, and D4. This finding suggests that allocation of staff members’ roles and responsibilities is a concern during not only the very early stages of planning but also throughout the early and middle stages. This is not surprising because as soon as the planning matures, e.g. to the advanced stage, it is assumed that the managers have been through this issue before, and thus have sorted out, to a certain extent, who will be doing what in preparing the programme. More specifically, the results indicate that when the planning matures, issues like allocation of staff for administrative support and academic support become very important.

When it comes to planning, in a more detailed fashion, whether there will be face-to-face meetings, or how much traditional teaching will be necessary, and therefore, what has to be taught, presented, discussed or introduced face-to-face, the tabulated data showed absolutely no logic at all. This is due to other factors (i.e. variables) that are responsible for affecting the importance level of such issues. However, the interview data revealed that, for sub-case study D2, none of the issues about the face-to-face meetings were rated as being important, but introduction to local libraries was. This can be explained by the fact that the manager of this programme has not had the opportunity to consider these issues before. Therefore, he could not decide whether they were important or not, which resulted in several neutral ratings (table E-5, appendix E). As he is at a very early stage of planning a DE programme, these issues have not yet emerged as a crucial matter of concern. However, having a face-to-face meeting to introduce the library to the new students was very important because this programme’s target group is postgraduate students and they may need to rely more on the services provided by the library, than undergraduates normally do. To conclude this section, table 8.1 summarizes the findings regarding the emerging issues according to the planning stages.
### Table 8.1: Emerging issues according to the planning stages

<table>
<thead>
<tr>
<th>PLANNING STAGES</th>
<th>Sub-case studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very early (D2)</td>
<td></td>
</tr>
<tr>
<td>Programme structure</td>
<td></td>
</tr>
<tr>
<td>Students' support</td>
<td></td>
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<tr>
<td>Staff members' workload</td>
<td></td>
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<tr>
<td>Cost benefit</td>
<td></td>
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<tr>
<td>Funding</td>
<td></td>
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<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Allocation of staff members</td>
<td></td>
</tr>
<tr>
<td>Early (D1)</td>
<td></td>
</tr>
<tr>
<td>Relationship with organizations:</td>
<td></td>
</tr>
<tr>
<td>- Site of instruction</td>
<td></td>
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<tr>
<td>- Respect to organizations' policies</td>
<td></td>
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<tr>
<td>Syllabus:</td>
<td></td>
</tr>
<tr>
<td>- Balance between DE and TE</td>
<td></td>
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<tr>
<td>- Amount of flexibility</td>
<td></td>
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<tr>
<td>Lecturers' reactions</td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
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<tr>
<td>Material development</td>
<td></td>
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<tr>
<td>Funding</td>
<td></td>
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<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Allocation of staff members</td>
<td></td>
</tr>
<tr>
<td>Middle (D4)</td>
<td></td>
</tr>
<tr>
<td>Entrance requirements for a completely different clientele</td>
<td></td>
</tr>
<tr>
<td>Access to computers</td>
<td></td>
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<tr>
<td>Ensuring students' learning</td>
<td></td>
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<tr>
<td>Updating material</td>
<td></td>
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<tr>
<td>Staff overload</td>
<td></td>
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<tr>
<td>Legislation/Regulation due to the nature of the course when delivered worldwide</td>
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<tr>
<td>Students' communication</td>
<td></td>
</tr>
<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Allocation of staff members</td>
<td></td>
</tr>
<tr>
<td>Quite Advanced (D6)</td>
<td></td>
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<tr>
<td>Relationship with industries</td>
<td></td>
</tr>
<tr>
<td>Time release for students by industry</td>
<td></td>
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<tr>
<td>Students' assessment</td>
<td></td>
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<tr>
<td>Requirements for overseas students</td>
<td></td>
</tr>
<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Allocation of staff members</td>
<td></td>
</tr>
<tr>
<td>Accreditation:</td>
<td></td>
</tr>
<tr>
<td>- Review by the University's teaching and learning committees</td>
<td></td>
</tr>
<tr>
<td>- Fitting to the University's policy</td>
<td></td>
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<tr>
<td>- Internal accreditation</td>
<td></td>
</tr>
<tr>
<td>- Approval by the Faculty of Sciences</td>
<td></td>
</tr>
<tr>
<td>- External accreditation by the official professional body</td>
<td></td>
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<tr>
<td>Advanced (D5)</td>
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<tr>
<td>Awareness among prospective students due to the nature of the course</td>
<td></td>
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<tr>
<td>Relationship with industries</td>
<td></td>
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<tr>
<td>Syllabus</td>
<td></td>
</tr>
<tr>
<td>Group work</td>
<td></td>
</tr>
<tr>
<td>Security and prevention of illegal duplication</td>
<td></td>
</tr>
<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Allocation of staff members</td>
<td></td>
</tr>
<tr>
<td>Very Advanced (D3)</td>
<td></td>
</tr>
<tr>
<td>Ensuring student-centred approach</td>
<td></td>
</tr>
<tr>
<td>Syllabus</td>
<td></td>
</tr>
<tr>
<td>Policy</td>
<td></td>
</tr>
<tr>
<td>Group work</td>
<td></td>
</tr>
<tr>
<td>Value/perception by the students</td>
<td></td>
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<tr>
<td>Resources:</td>
<td></td>
</tr>
<tr>
<td>- Structure of resource management</td>
<td></td>
</tr>
<tr>
<td>- Pay back time</td>
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</tr>
</tbody>
</table>
8.8 The updated frameworks

The frameworks have proven extremely successful. Eighty-two percent of the issues from the original frameworks (chapter 7) were rated as being important or very important for the planning of effective DE programmes. Tables 8.2.a-c present a summary of these important and very important issues according to the results from the managers’ survey.

Table 8.2.a: Very important and important issues about students' information and access to infrastructure

<table>
<thead>
<tr>
<th>Very early (D2)</th>
<th>Early (D1)</th>
<th>Middle (D4)</th>
<th>Quite Advanced (D6)</th>
<th>Advanced (D5)</th>
<th>Very Advanced (D3)</th>
</tr>
</thead>
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<tr>
<td><strong>Students' information</strong></td>
<td><strong>Students' information</strong></td>
<td><strong>Students' information</strong></td>
<td><strong>Students' information</strong></td>
<td><strong>Students' information</strong></td>
<td><strong>Students' information</strong></td>
</tr>
<tr>
<td>Age, Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
<td>Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
<td>Age, Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
<td>Age, Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
<td>Age, Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
<td>Age, Number of children, English level for non-native speakers, Full-time/Part-time, Working/Not working</td>
</tr>
<tr>
<td>- Background: Social, Economic, Educational, Cultural, Familiarity with IT/Internet</td>
<td>Previous experience with DE</td>
<td>Educational</td>
<td>Educational</td>
<td>Educational</td>
<td>Educational</td>
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<tr>
<td>- Individual needs</td>
<td>- Individual needs</td>
<td>- Individual needs</td>
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<td>- Individual needs</td>
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</tr>
<tr>
<td>- Ambitions</td>
<td>- Ambitions</td>
<td>- Ambitions</td>
<td>- Ambitions</td>
<td>- Ambitions</td>
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<tr>
<td>- Expectations</td>
<td>- Expectations</td>
<td>- Expectations</td>
<td>- Expectations</td>
<td>- Expectations</td>
<td>- Expectations</td>
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<tr>
<td>- Interests</td>
<td>- Interests</td>
<td>- Interests</td>
<td>- Interests</td>
<td>- Interests</td>
<td>- Interests</td>
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<tr>
<td>- Main site of instruction</td>
<td>- Main site of instruction</td>
<td>- Main site of instruction</td>
<td>- Main site of instruction</td>
<td>- Main site of instruction</td>
<td>- Main site of instruction</td>
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<td><strong>Access to infrastructure</strong></td>
<td><strong>Access to infrastructure</strong></td>
<td><strong>Access to infrastructure</strong></td>
<td><strong>Access to infrastructure</strong></td>
<td><strong>Access to infrastructure</strong></td>
<td><strong>Access to infrastructure</strong></td>
</tr>
<tr>
<td>- Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
<td>Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
<td>Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
<td>Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
<td>Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
<td>Services: Library, Laboratory, Administration, Academic/Research staff, English support</td>
</tr>
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</table>
Table 8.2.b: Very important and important issues about choosing the technology and allocation of staff

<table>
<thead>
<tr>
<th>Very Early (D2)</th>
<th>Early (D1)</th>
<th>Middle (D4)</th>
<th>Quite Advanced (D6)</th>
<th>Advanced (D5)</th>
<th>Very Advanced (D3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Choosing the appropriate technology</strong></td>
<td><strong>Choosing the appropriate technology</strong></td>
<td><strong>Choosing the appropriate technology</strong></td>
<td><strong>Choosing the appropriate technology</strong></td>
<td><strong>Choosing the appropriate technology</strong></td>
<td><strong>Choosing the appropriate technology</strong></td>
</tr>
<tr>
<td>- Delivery: Content, Students' assignments</td>
<td>- Instruction: Discussion, Tutorial, Group work</td>
<td>- Instruction: Lecture, Tutorial, Group work</td>
<td>- Support: Academic, Administrative</td>
<td>- Instruction: Lecture, Discussion</td>
<td>- Instruction: Discussion, Tutorial</td>
</tr>
<tr>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
<td><strong>Allocation of staff members' roles and responsibilities</strong></td>
</tr>
<tr>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
</tr>
<tr>
<td>- Academic support</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
</tr>
<tr>
<td></td>
<td>- Academic support</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
<td>- Technical support: Site facilitator for computer conferencing/Videoconferencing or other synchronous sessions, Support via e-mail</td>
</tr>
</tbody>
</table>
### Table 8.2.c: Very important and important issues about face-to-face meetings

<table>
<thead>
<tr>
<th>Very early (D2)</th>
<th>Early (D1)</th>
<th>Middle (D4)</th>
<th>Quite Advanced (D6)</th>
<th>Advanced (D5)</th>
<th>Very Advanced (D3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face meeting(s) between lecturers and students</td>
<td>Face-to-face meeting(s) between lecturers and students</td>
<td>Face-to-face meeting(s) between lecturers and students</td>
<td>Face-to-face meeting(s) between lecturers and students</td>
<td>Face-to-face meeting(s) between lecturers and students</td>
<td>Face-to-face meeting(s) between lecturers and students</td>
</tr>
<tr>
<td>- Induction session at the start of the course: Providing social interaction, Introducing lecturers and staff members</td>
<td>- Induction session at the start of the course: Providing social interaction, Introducing lecturers and staff members</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
</tr>
<tr>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Making expectations clear: From the lecturer, students</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Making expectations clear: From the lecturer, students</td>
<td>- Setting procedures: Delivering assignments to lecturers, Assessing students' work</td>
<td>- Making expectations clear: From the lecturer, students</td>
</tr>
<tr>
<td>- Making expectations clear: From the lecturer, students, technicians</td>
<td>- Introduction to local library(ies)</td>
<td>- Making expectations clear: From the lecturer, students</td>
<td>- Introduction to local library(ies)</td>
<td>- Making expectations clear: From the lecturer, students</td>
<td>- Introduction to local library(ies)</td>
</tr>
</tbody>
</table>

Nevertheless, a few additional issues were proven relevant after the data analysis of the interviews:

- Relationship with organizations/industries
- Accreditation: internal (the University), and external (the official professional body)
- Funding
- Support for disabled and special needs students
- Study and learning skills support

Thus, they should be included in the original frameworks.
8.9 Conclusions

The frameworks have proven to be a reliable and extremely helpful tool to aid the planning of effective delivery of DE programmes that considers the socio-technical ramifications derived from these kinds of initiative. When asked whether the questionnaire had helped the managers to think about issues they had not had the opportunity to consider before, there was a unanimous positive response.

This study offers a significant insight into the factors that impair and promote DE initiatives by investigating the critical issues that require careful consideration when planning effective DE programmes that fall under similar circumstances to the case studies carried out in this thesis. Nonetheless, this does not mean that all the issues raised after conducting the case studies have to be strong within their DE programmes. As seen earlier (chapter 7), human beings have a natural capacity to accommodate whenever necessary. For example, from a socio-technical perspective, when the technology in use is not effective, tutors tend to compensate to meet the students’ needs. Therefore, what happens in reality is that the social system strengthens in order to accommodate a weak technical system. This raises an important discussion about the level to which social systems have to accommodate and to what extent technical systems can be designed to minimize such accommodation. As seen earlier, high levels of accommodation by the social system can lead to severe human costs. Research in human factors/ergonomics is committed to enabling optimization in the interaction between social and technical systems so that it avoids severe human costs. The issue here is that social accommodation is intrinsic to human nature and that capability, to a certain extent, is what makes the whole system work effectively. Therefore, there is a very thin line between the extent to which a social system can accommodate in order to promote a healthy and harmonic interaction with the technical system, and yet not to the extent of suffering severe human costs such as disillusion, depression, anxiety, sleep deprivation, and impaired learning.

Moreover, not only has the question raised by Goodman been answered positively, it was also possible to further this goal and identify the emerging specific issues that arise in each different stage of the planning process. It is therefore anticipated that the results discussed and outlined in this chapter provide an important contribution to the existing literature in the field.
Chapter 9

Discussion and Conclusion

9.1 Chapter outline

This chapter focuses on the discussion of the over-riding conclusions derived from the work carried out in this thesis. This chapter starts by introducing the concluding remarks, then section 3 reviews the methodological procedures in light of their weaknesses and strengths. Section 4 discusses the lessons learned and provides the summary of answers to the research questions posed in chapters 1 and 2. Section 5 outlines the practical implications of this study, section 6 provides directions for future work, and finally section 7 presents an insight into the final conclusions that were drawn from this thesis. Figure 9.1 illustrates this chapter in relation to the overall thesis structure.

9.2 Introduction

This section provides a summarized review of what this thesis was about. The aim of this thesis was to explore the factors that can lead to effective forms of delivering DE. To achieve this, in-depth exploration of three case studies of different forms of DE being delivered in different countries were carried out. Significant lessons were learned from these case studies but it was necessary to perform a cross-case study analysis in order to build socio-technical models of the delivery of DE. Again, important lessons were learned from this synthesis of data. The findings derived from this study were crucial for the design of the range of frameworks and models for DE planning, i.e. the planning aid tool for effective DE delivery. Once this tool was designed it was then necessary to test its reliability and validity. To do this, a fourth set of case studies was carried out. This not only confirmed the effectiveness of the planning aid tool but also strengthened the results of this thesis. This chapter aims to provide a summarized review of the lessons learned about what contributes to effectiveness in DE delivery. The next section reviews the methodology used in this thesis.
9.3 Methodological review

The methodological procedures performed to carry out the work in this thesis have revealed both weaknesses and strengths that are typically intrinsic to conducting research itself. For example, as far as weaknesses of the methodology are concerned, the data obtained from the case studies were self-reports, i.e. mostly from interviews and questionnaires. This means that there was no objective evidence about the learning outcomes of students or comparative data, e.g. DE versus TE in the same subject. One of the underlying reasons for not collecting objective evidence is that this kind of research was not ready for a more positivistic approach prior to the contributions derived from the work in this thesis. Furthermore, only a positivistic approach, e.g. performing experiments in controlled environments, could provide such objective evidence. Moreover, for this thesis work, it was quite difficult and time-consuming to get access to conduct surveys in the variety of different settings (Local College, University in Northern Ireland, North American University, and the UK University) as well as obtaining an adequate number of staff and students to volunteer for the surveys. Collecting objective evidence about, for example, students scores would have raised ethical issues and the universities and colleges may not have co-operated.

However, the way the study was performed has provided a series of significant strengths that cannot be underestimated. For example, the naturalistic approach of case studies provided the means of obtaining a much richer set of data from individual interviews, classroom observation, and questionnaires. This rich set of data allowed for an in-depth analysis to provide a more meaningful range of findings and, above all, a holistic approach to the DE delivery phenomenon, at least from a human factors perspective. This holistic approach provided the necessary and appropriate array of factors which are important in the delivery of effective DE programmes. In addition, this array of factors was derived from two different perspectives: staff and students, which also contributed to the strengthening of the findings by data triangulation. Furthermore, the same set of methods used across the three case studies A, B and C also contributed to strengthening the findings by methodological triangulation, since the analysis of comparisons and contrasts (chapter 7) revealed whether the same factors were influential in different cases. The next section outlines the summary of lessons learned from this thesis.

9.4 Lessons learned

Important lessons were learned from this study. Before presenting a review of the answers to the research questions, a broader set of concluding remarks are first discussed. For example it cannot be stated that DE is either better or worse than TE, although the views of the staff and students provided data on both positive and negative aspects of teaching and learning at a distance. It is therefore possible to state the factors that contribute to effective DE delivery as well as to understand how technical and social factors contribute to it and impair it. Moreover, it is a reasonable assumption that DE can not completely substitute for TE and it should not intend to. The findings from this thesis make it clear that DE is effective. Most of the responses from both students and lecturers about the effectiveness of DE were positive. However, most would have preferred TE so it is best seen as an alternative to provide access to education for people who may not have it otherwise.

As far as effectiveness of the technology is concerned, the entire diversity of technology examined in this thesis appears to work effectively, although some more and some less than others. For example, in case study B, videoconferencing via ISDN was found to be less effective than the multiple technologies and multimedia of case study C. This is because the multitude of communication channels used in case study C, provided more options for interaction, hence an appropriate means of communication between lecturers and students and among the students could be chosen from a variety of media, for a set of defined tasks. In fact, the main factors that impaired the use of videoconferencing effectively were the tasks that rely on good channels of communication; consultation with lecturers and group work activities. Therefore, there is enough evidence that a mixture of technologies that delivers the content appropriately, enables the students to communicate with lecturers and other students, ask questions and receives feedback from lecturers, and submits assignments, is a more effective way of delivering DE. However, there is still room for more developments in the DE technologies and media. For example, findings from case study C showed evidence that none of the existing technologies are effective enough for group work activities, specially for dealing with mathematics, equations and programming codes in a shared electronic environment. However, these findings cannot lead to an absolute conclusion without considering other variables. For example, the effectiveness of a DE programme via videoconferencing can be measured in terms of the videoconferencing capabilities and in terms
of the lecturer's ability to conduct the DE course in a way that fits the characteristics of the medium, the nature of the course materials and the characteristics of the students (Hiltz, 1994). This raises the point about whether lecturers and students can exploit the potential of videoconferencing to support an active teaching and learning process (Mason, 1999) that incorporates interaction among the students as well as between students and lecturers, and whether they receive appropriate support (e.g. technical, academic, social). Moreover, from this case study (B) it was concluded that the management and organization of DE by this University (in Northern Ireland) was quite weak. For example, there was a mismatch of scheduling for the use of the videoconferencing lecture room, and classes after 5:00PM did not have technicians available. These would have required the social system, lecturers and students, to compensate for the weakness of the organization and management. However, in this case study there was little opportunity for compensation by the social system, therefore, there was a lower level of satisfaction when compared to case studies A and C (see table 7.2 in section 7.5.1 of chapter 7).

In case study C, the level of effectiveness of DE through multiple technologies was found to be very positive, except for group work activities and consultation with lecturers and tutors according to the students' views (see table 6.15 in section 6.7 of chapter 6). For example, the sample of students from the Department of Mathematical Sciences (sample B) found DE via multiple technologies to be quite ineffective for activities that involve students working together, such as group work (see table 6.13, in section 6.5.3). This suggested that subject matter and perhaps gender — this sample of students included predominantly male students from the Mathematical Sciences — were both contributory factors that affected the effectiveness of DE, particularly for communication and group work activities. However, it was concluded that the largest barrier to these students performing group work activities and communicating with tutors, lecturers and other students effectively was the limitation of the current technology for dealing with mathematics. In fact, programming codes, which involves extensive use of mathematical symbols and equations are not well managed by current networked technologies in a shared working environment. This means that group work activities and communication are both greatly affected when dealing with mathematics. Even though these were some of the issues, it was concluded that, as a consequence of the opportunities for communication through multiple channels, multiple technologies can offer an effective way of delivering DE particularly when compared to case studies B, which depended solely on the use of videoconferencing for lectures. Moreover, it was also concluded that the success of this case study (C) was its strong management, organization, technical support, and above all, the strong commitment of its staff to providing excellent standards of education. The next paragraphs provide a summary of the findings in light of the research questions posed earlier in this thesis (sections 1.10 of chapter 1 and 2.7 of chapter 2).

a) What are the human factors issues in delivering education at a distance?

As far as human factors issues are concerned, this research has provided a contribution to the field of distance education because there has previously been limited efforts on the investigation of the human factors in the delivery of DE. The field of human factors (or ergonomics, in a broader sense) has also benefited from this research because, as seen earlier (chapter 2) there has not been sufficient naturalistic investigation of such a phenomenon in four distinct settings. Hence, prior to this research, there was a very limited basis for generalizations to the real world. In conclusion, it appears that the variables that cause human factors issues in teaching and learning at a distance include:

- Characteristics of the students, background, needs, ambitions, expectations, and interests; site of instruction;
- Access to required and appropriate infrastructure; required and appropriate technology for communication, instruction, delivery, support, and evaluation;
- Lecturers' behaviour (e.g. responsiveness, commitment to the DE programme);
- Number of students per on-line discussions, time lag in synchronous classes, quality of audio and video tools, technical support, amount of information per screen on a CBM, the role of the moderator in WebBoard discussions, overloading lecturers' mail boxes prior to deadlines for e-mail assignments submissions, cost and scheduling of long distance telephone calls;
- Roles and responsibilities of staff members for administrative, technical, academic, counselling, and English support;
- The number of face-to-face meetings for induction session at the start of the course, for introducing basic concepts of DE, for setting procedures for assignments delivery and assessment, for making expectations clear, and for introducing local libraries and laboratories; and
- Appropriate support and training for lecturers on diverse aspects of DE (staff development programme).
b) What kinds of issues (i.e. variables) affect the effectiveness of DE programmes?

In fact, all human factors issues appear to have an impact on the effectiveness of the DE delivery, to a greater or lesser extent. This is explained by the fact that any task performed by human beings is bound to be affected by human factors, which inevitably contributes to or impair its effectiveness. Therefore, this concept is applicable to the DE delivery phenomenon. The remaining parts of this section outline these issues in more detail.

c) What kinds of issues impact students' achievement in DE settings?

The literature review has indicated some of these issues - e.g. work, social, and family commitments; lack of motivation, self-discipline, and time; the nature of the delivery media; the subject matter and course content; and both working and study environments (figure 3.3 in section 3.3 of chapter 3). The cases confirm that these factors are important, but a systematic approach to different DE settings has revealed an array of more specific issues that have been listed in answering question (a).

d) What are the causes of successful DE programmes?

This research’s findings (specifically results from case studies B and C) have suggested that a DE programme, in order to be successful and thus effective, has not only to be deeply committed to satisfying its stakeholders’ needs, aspirations, dreams, expectations, and interests, but also needs strategic management by the educational institution, which includes appropriate organization of DE. For example, as far as planning for DE via videoconferencing is concerned, it is reasonable to conclude that the greater the number of sites, the more complex it is for effective teaching and learning to occur. It was concluded that scheduling was one of the problems faced by the lecturers due to a weak management and organization by the University where the case study B was conducted. Another example that supports this conclusion was found in the reviewed literature at a North American university: “scheduling and outlining the distance learning course one year in advance was necessary due to the many disciplines requiring use of the interactive video classrooms and the corresponding decreased flexibility in scheduling. This scheduling was made more complicated when considering who would lead the laboratory experiences at the distant site” (English et al., 1998; p.229). Above all, one also needs to perform a strategic plan for an effective delivery of a DE programme, which involves careful consideration of all the human factors issues listed in the answer to question (a). The planning aid tool presented in chapter 7 provides a structured way of presenting them and it has proven to be extremely helpful to those seeking to plan an effective DE programme, as shown in chapter 8.

e) What kinds of issues affect the main stakeholders’ use and attitudes towards DE technologies?

The human factors issues in DE, listed in the answer to question (a), when inappropriately managed, may cause a number of human costs. As seen and discussed in chapters 4, 5, and 6; these human factors costs include anxiety, insomnia, and even depression; which are mainly caused by disillusionment with the course, lack of motivation, and frustration. These human costs are proven to cause a number of negative students’ outcomes such as high drop out rates, slow and perturbed learning, and ultimately ineffectiveness over the DE programme. From the lecturers’ perspectives, there has been an issue of increased workload, without acknowledgement by the University, who make an effort to teach at a distance.

f) How experience with DE relates to satisfaction with this mode of instruction?

Results from chapter 5 have indicated a trend to the conclusion that the more experience students have, in general, the less positive were their attitudes towards DE via videoconferencing, such that they sometimes had a more negative attitude in comparison with the less experienced students. However, further investigation with a greater number of students would be necessary to permit a more objective concluding statement. Nonetheless, at this stage, it is sufficient to conclude that there is a relationship between students’ level of experience with DE and their satisfaction with this mode of instruction. Whether this relationship is positive (both variables increase), negative (both variables decrease), or contrasting (more experience relates to less satisfaction or vice-versa), was not a major concern of this research and remains to be seen in future research.
g) How to structure the early stages of planning an effective DE programme?

Chapter 7 has provided a number of conceptual frameworks and models for the early planning of effective DE programmes. These frameworks and models are the essence of the planning aid tool needed for a systematic and structured way of getting started with the planning of a programme. Although the planning aid included the entire array of factors that contribute to an effective DE delivery, it does not mean that all the factors from the frameworks have to be necessarily strong in a DE programme. In particular, one of the lessons learned from building the conceptual socio-technical models of delivering diverse forms of DE in three distinct settings (figures 7.2, 7.3 and 7.4 in section 7.6.1 of chapter 7) is that the social system tends to accommodate as a result of a weak technical system. As such, the conceptual frameworks and models for planning effective DE provide a contribution to make it unnecessary for local social accommodation to be necessary after implementation. As seen earlier, long term and severe social accommodation by the social system can lead to human costs and these human costs promote a series of undesired outcomes. In chapter 8, the reliability and validity of the planning aid tool (frameworks and models presented in chapter 7) was tested and proven reliable for a successful DE initiative.

h) "Is it possible to prioritize the variables that impact on distance learning in terms of importance?" (Goodman, p. 20)

One of the aims of Chapter 8 was to address Goodman's question. Several charts illustrated the variables' prioritization by showing their level of importance (figures 8.3 to 8.15 in section 8.6 of chapter 8). The frameworks have proven to be a reliable and extremely helpful tool to aid the planning of effective delivery of DE programmes that considers the socio-technical ramifications derived from these kinds of initiative. Unanimously, the managers surveyed in case study D reported that the frameworks gave them an opportunity to think about issues that they had not considered before. This happened when they were exposed to the Likert questionnaire (which translated the conceptual frameworks and models into a checklist), because they had not possessed prior knowledge of the entire array of issues and their socio-technical implications for an effective DE delivery. Therefore, this thesis has offered a significant contribution to the strategic, structured and holistic planning of DE delivery because of the prior consideration of the factors that impair and promote DE initiatives. As seen earlier, human beings have a natural capacity to accommodate themselves whenever necessary. For example, from a socio-technical perspective, when the technology in use is not satisfactory, then tutors tend to compensate to meet the students' needs. DE has therefore impacted on the roles and responsibilities of the lecturer. As seen in case study A, the tutors had to provide 'help sheets' and handouts to students because of a weak technical system that was not appropriately designed to satisfy the needs of the very beginner learners. In case study C, lecturers had appointed mentors to cope with the demands for support from students. Therefore, what happens in reality is that the social system strengthens in order to accommodate weak technical systems. Moreover, not only has the question raised by Goodman been answered positively, but it was also possible to further this goal and identify the emerging specific issues that arise in each different stage of the planning process (table 8.1, section 8.7, chapter 8). It is therefore anticipated that the results discussed and outlined in this thesis will provide an important contribution to the field.

9.5 Practical implications

The work carried out in this thesis has contributed to the current state of the art research in human factors of DE and their implications for the effectiveness of its delivery. This is because previous research (particularly, Wagner, 1995 and Goodman, 1999) had not examined eleven crucial factors that arose during this current work:

1. Access to infrastructure like on-line libraries services for the distant students (figure 7.6, chapter 7)
2. English support for international students, and counselling; communication and group work activities (figure 7.7, chapter 7)
3. Implications of communicating at a distance through a variety of Network tools (figure 7.8, chapter 7)
4. Implications of the use of the technology for mediating instruction (figure 7.9, chapter 7)
5. Implications of the use of the technology for DE delivery (figure 7.10, chapter 7)
6. Implications of the use of the technology for the diverse support services to the distant student (figure 7.11, chapter 7)
7. Allocation of roles and responsibilities for staff members to deal with distant students (figure 7.12, chapter 7)
8. Decision about the appropriate balance between DE and TE (figure 7.13, chapter 7)
9. Internal and external accreditation (from list below table 8.2.c, chapter 8)
(10) Support for disabled and special needs students at a distance (from list below table 8.2.c, chapter 8); and
(11) Study and learning skills support for distant students (from list below table 8.2.c, chapter 8).

Therefore, these eleven factors are what distinguishes the work of this thesis from the work carried out by others researchers and practitioners. From now on, decision and policy makers will have a new range of factors to look into if the DE endeavour is to be successful.

9.6 Future research directions

From a naturalistic perspective, in order to further investigate the multitude of factors relevant to planning DE, it is suggested to look at other stages of planning, not only the early stages, but also the diverse developmental stages. This would require an enormous amount of time, perhaps a 10-year longitudinal study following the progress of several DE initiatives. As a consequence, this kind of study could not be undertaken in the current work because it is not appropriate for a Ph.D. research. However, it would provide a significant contribution to the investigation of planning effective DE programmes.

Furthermore, Berge and Schrum’s (1998) research on strategic planning for DE includes policy change issues. Although looking at policy issues falls outside the scope of this thesis, research efforts in this particular issue would support the decision-making process for policy and pedagogy change. These authors argue that “the challenges of planning and implementing DE programmes effectively include pedagogical changes, institutional issues, and organizational structure” (p.32). “Identifying external and internal policies affecting DE, especially during the initial phases, is critical to overall success” (p.33). As far as strategic planning is concerned, Albrecht and Bardsley (1994, p.68-69) add that:

“The process of strategic planning for DE should not be perceived as essentially different from other forms of academic planning (...) Any strategic plan seeks to avoid common mistakes: in DE those include the premature selection of a technology, the emphasis on technical planning, and the neglect of market factors and programme resources”.

As far as faculty resistance and pedagogical change are concerned, in the late 90’s, Jaffee argued that “thus, there were a variety of environmental forces that suggested the transformation of organizational practices in higher education. However, educational institutions seem highly resistant to these increasingly powerful environmental pressures” (1998, p.25). “In conclusion, the future of ALN-style teaching [asynchronous learning network] and learning will depend upon the acceptance and receptivity of teaching faculty to this and other instructional technologies and alternative learning modes. As human organizations, institutions of higher education are constrained by habit, tradition, and culture. These represent the most significant obstacles to organizational change and they therefore must be recognized and addressed in order to realize genuine pedagogical and institutional transformation” (p.30). Although specific pedagogical issues do not fall into the scope of this thesis, research in the field would benefit from more efforts into addressing this issue.

Another possible option would be the investigation of specific economic issues such as cost-benefit analysis of DE courses. However, technology and thus media have been evolving so rapidly, and as a consequence their costs have been dropping accordingly, that any long term research effort would run quite a high risk, and therefore the appropriateness of this kind of study for a Ph.D. research development would be debatable. In addition, research developments in very specific areas such as management Web tools including registration procedures, rapid feedback, test taking, authentication and, as Bourne et al. (1997) argue, a “host of other techniques and technologies must be worked out” before DE can obtain wide-spread acceptance (p.55). An in-depth examination of needs from different subject matters and on the changing role of the tutor in future systems would be appreciated as well.

From a positivistic perspective, the trend indicated by one of the results from case study B (chapter 5), could not suggest enough evidence to be conclusive without obtaining a larger sample of students. This trend has lead to hypothesizing the following: there is a positive relationship between students’ level of experience with learning at a distance and their level of satisfaction with this way of learning. The underlined words are the variables under consideration. A suggestion for furthering this study would be to recruit two samples with a significant number of students (one sample formed by students with previous significant experience with DE and the other with no previous experience) and survey their level of satisfaction with DE in relation to their level of experience. Following
this data collection procedure, the next step would be to perform a non-parametric statistical test to validate or reject the hypothesis.

9.7 Final conclusion

To conclude, this thesis raises an important discussion about the level to which social systems have to accommodate and to which extent technical systems can be designed to minimize such accommodation. As seen earlier, long term and high levels of accommodation by the social system can lead to severe human costs. Research in human factors is committed to the optimization of the interaction between social and technical systems so that it seeks to avoid severe human costs. The matter here is that social accommodation is intrinsic to human nature and that capability, to a certain extent, is vital and it is what makes the whole system work effectively. Therefore, there is a very thin line between the extent to which a social system can accommodate in order to promote a healthy and harmonic interaction with the technical system, and yet not to the extent of suffering severe human costs such as disillusion, depression, anxiety, sleep deprivation, and impaired learning.

From a holistic perspective, it is safe to assume that effective DE is more the result of planning and preparation rather than innovation or sophisticated technologies. While more research is always needed, because the concept of research is a dynamic process rather than static, a substantial research foundation has been achieved. This leads to the conclusion that teaching and learning at a distance can be effective, provided that the issues identified, examined and discussed throughout this thesis and summarized in the form of a range of conceptual frameworks and models, are taken carefully into consideration prior to and during the early stages of planning a DE initiative.

The final concluding remarks outlined in this section were described in a way to avoid a summary of the isolated conclusions from the work carried out and described in each earlier chapter. In principle, this is because the author of this thesis believes that the sum of the parts, i.e. each individual conclusion from each chapter, does not provide a full conclusion of the whole study. As a result, this chapter has attempted to look beyond the concluding remarks of each previous chapter in isolation and move towards a more holistic perspective.
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Appendices
TEXT BOUND INTO

THE SPINE
APPENDIX A-1: Tutors Survey Form (Case Study A)

We want to hear from you! Let us know what you think of this training and how we can improve it. Your opinions will be studied carefully and will affect future course offerings. All personal data and answers are strictly confidential and tutors will not be identified in the survey report.

Personal Data:
Surname:__________________________Middle name:__________________________First name:__________________________
Female( ) Male( ) Age:__________

1. Computer-based material
1.1 What do you teach? (which subject matter, module?)

1.2 Do you find the computer-based material helpful?

1.3 Do you use any paper-based teaching material?

1.4 How much time did you spend preparing the paper-based teaching material?

2. Stakeholders
Who are directly or indirectly affected by the distance learning programme?
Learners ( ) Tutors ( ) Project leaders ( ) Technicians ( )
Others, please specify:__________________________

2.1 Learners
2.1.1 How experienced are the learners with the use of computers?
Beginners ( ) Intermediates ( ) Advanced ( )

2.1.2 What are the learners initial requirements?

2.1.3 What do the learners expect from the current course?

2.1.3.1 Are the learners required to have experience with computers?

2.1.4 What are the learners ambitions?

2.1.5 What are the learners' main issues?

2.1.6 Do they have enough learning support?

2.1.7 Do they have enough technical support?

2.1.8 How motivated are the learners? Completely unmotivated — Very motivated

2.1.8.1 If the learners are not motivated, could you tell me the reason(s)?

2.2 Tutors
2.2.1 Would you prefer teaching this subject matter by 'traditional education' or is 'distance education' adequate? Please, give your reasons.

2.2.2 In which sense has your role as a tutor changed compared to the traditional way of teaching?

2.2.3 Have you had any problem using distance education in this course?

2.2.4 Please give me your general opinion about distance education. Which benefits do you get from using distance education?

2.2.5 Do you think distance education and computer-based materials can support the teaching process for all types of subject matter or they are only adequate for certain kinds of subject matter?

2.2.6 How often do you contact your students?
( ) Never ( ) Twice per month ( ) Every week
( ) Every three days ( ) Nearly every day

2.2.7 How often do you contact other tutors?
( ) Never ( ) Twice per month ( ) Every week

2.2.8 What method of contact with learners do you use and what problems have you encountered with it?

2.2.9 In your opinion, what are the positive aspects of Distance Education?

2.2.10 What do you expect from this course?

2.2.11 How long have you been teaching via Distance Education?

2.2.12 How long have you been teaching for this course?

3. Environment
3.1 What are the learners' resources?

3.2 Is there any lecture room or Lab available to give learners a chance to meet each other and the tutor?

3.3 What platform do the learners use?
( ) PC ( ) Macintosh
( ) PC with Internet connection ( ) Macintosh with Internet connection
( ) PC with Internet connection and multimedia devices ( ) Macintosh with Internet connection and multimedia devices
( ) PC with Internet connection, multimedia devices and videoconferencing ( ) Macintosh with Internet connection, multimedia devices and videoconferencing

4. General Issues
4.1 What are the main reasons for taking a distance learning course?

4.2 What are the main causes of drop out?

4.3 Do you have any further comments or issues that should be addressed?

4.4 Have the learners reported any problems or difficulties? If yes, could you please tell me about them?

4.5 Have the learners reported any positive aspects? If yes, could you please tell me about them?

Thank you for your co-operation!

Tel: P. Hirasuka
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Loughborough University
Department of Humanities
Loughborough, Leics, LE11 3TU
E-mail: T.P.Hirasuka@lboro.ac.uk

Note: All data and answers will not be passed on and will be kept strictly confidential.

Winter 1998/1999
APPENDIX A-II: Learners Survey Form (Case Study A)

We want to hear from you! Let us know what you think of this training and how we can improve it. Your opinions will be studied carefully and will affect future course offerings. All personal data and answers are strictly confidential and learners will not be identified in the survey report.

SECTION I: Personal Data

1. First name: ___________________ Middle name: ___________________ Surname: ___________________
2. Telephone #: ___________________ Fax #: ___________________ E-mail: ___________________
3. Course: ___________________ Module: ___________________
4. Are you studying for a specific qualification? If yes, which qualification? ___________________
5. Institution: ___________________ Occupation: ___________________
6. Age group: ( ) 20-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 60 +
7. Gender: ( ) Female ( ) Male
8. Ethnic background: ( ) White/Anglos ( ) Hispanic/Latinos ( ) Asian ( ) Middle Eastern/Persians ( ) Black/African
9. Is English your first language? ( ) Yes ( ) No
10. How long have you been working at this institution? ( ) 6 months - 2 years ( ) 2 - 5 years ( ) 5 - 10 years ( ) 10 + years
11. Do you have computer at home? ( ) Yes ( ) No
12. If yes, do you have Internet connection at home? ( ) Yes ( ) No
13. If not, where do you have access to computer with Internet connection? ( ) At work ( ) At the College Lab ( ) Others, please specify ___________________
14. Do you have printer available? ( ) Yes ( ) No
15. Why have you decided to take this course? ___________________
16. How long have you been taking this course? ___________________
17. Have you had computer-based training before? If yes, what was the subject matter? ___________________
18. Have you had IT (Information Technology) training before? If yes, when? ___________________
19. What were your expectations (ambitions, desires, requirements, needs) before taking this course? ___________________

SECTION II: Usability

1. Is the current course your first distance learning experience? ( ) Yes ( ) No
2. If not, when was your first distance learning experience? ( ) Month ( ) Year
3. How long have you been using a computer? ( ) For less than 3 years ( ) For 3 - 5 years ( ) For 5 - 7 years ( ) For 7 - 9 years ( ) For more than 9 years
4. If you use Internet. How long have you been using Internet? ( ) For less than 3 years ( ) For 3 - 5 years ( ) For 5 - 7 years ( ) For 7 - 9 years ( ) For more than 9 years ( ) Not Applicable
5. How often do you use the following in your study? (1) do not use/not available (2) twice per month (3) every week (4) every three days (5) once per month (6) Just once or twice during one year
   Face to face meetings with your tutor ( )
   Face to face meetings with your colleagues ( )
   Royal mail ( )
   Express mail ( )
   E-mail ( )
   Fax ( )
   Voice-mail ( )
   Telephone ( )
   Pager ( )
   Printer ( )
   Chat room on the Web ( )
   Audio conferencing ( )
   Video conferencing ( )
6. What is the main method of contact with tutor? ___________________
6.1 What are the problems with this method of contact? ___________________
7. Do you prefer reading on the screen or printing the document out? Choose just one answer. ( ) I prefer reading on the screen when the document is no longer than 1 page. ( ) I prefer reading on the screen when the document is no longer than 2 pages. ( ) I prefer reading on the screen when the document is no longer than 3 pages. ( ) I prefer printing the document out whenever it contains important information or it is very interesting. ( ) I scan through (to have a quick look) the document because the printer is located in another room so that it is not easily accessible. ( ) I scan through (to have a quick look) and save the document to be read afterwards because I do not have a printer available.
8. On average, how much time do you spend per week on this training? ( ) Less than one hour. ( ) One to less than four hours. ( ) Four to less than ten hours. ( ) Over ten hours.
9. Please circle the numbers which most appropriately reflect your impressions about using this computer-based material. Note that NA = Not Applicable.

9.1 Overall reactions to the computer-based material:

<table>
<thead>
<tr>
<th>Task</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tense</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frustrating</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Displeased</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rigid</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wonderful</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>Satisfying</td>
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<td>2</td>
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<td></td>
</tr>
<tr>
<td>Stimulating</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
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<tr>
<td>Easy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Flexible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

9.2 Screen:

<table>
<thead>
<tr>
<th>Character on the computer screen</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard to read</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very legible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Slightly legible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>adequate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Logical</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Unpredictable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Impossible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Progressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
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<tr>
<td>Consistent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Unclear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Unclear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>Ambiguous</td>
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<td>Precise</td>
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<td>4</td>
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<td></td>
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<tr>
<td>Clear</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<td></td>
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<tr>
<td>Unclear</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<td>Never</td>
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</tr>
<tr>
<td>Always</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
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</table>

9.4 Learning to operate the system:

<table>
<thead>
<tr>
<th>Performing an operation leads to a predictable result</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Feedback messages</th>
<th>Unhelpful</th>
<th>Helpful</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Error messages</th>
<th>Unhelpful</th>
<th>Helpful</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks can be performed in a simple straightforward manner</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of steps per task</th>
<th>Too many</th>
<th>Just right</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steps to complete a task follow a logical sequence</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedback on the completion of sequence of steps</th>
<th>Unclear</th>
<th>Clear</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>9.5 Installation/Downloading</th>
<th>Difficult</th>
<th>Easy</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Speed of downloading</th>
<th>Slow</th>
<th>Fast</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Downloading only the module you want</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infoms you the file size for downloading</th>
<th>Never</th>
<th>Almost Never</th>
<th>A Little</th>
<th>Fairly</th>
<th>Very</th>
<th>Always</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. How often do you consult manuals or help sheets?

- Never ( )
- At least once every week ( )
- Twice per month ( )
- Every three days ( )
- Every day ( )
- A few times a year ( )
- Just consulted once in early stages ( )

11. Do you find manuals helpful? ( ) Yes ( ) No ( ) Sometimes

12. Do you have enough learning support from tutors? ( ) Yes ( ) No ( ) Sometimes

13. Do you have enough technical support? ( ) Yes ( ) No ( ) Sometimes

SECTION III: Acceptability

1. How satisfied with the current course are you?

- Completely dissatisfied ( )
- Slightly dissatisfied ( )
- Not satisfied at all ( )
- Satisfied ( )
- Very satisfied ( )
- Completely satisfied ( )
2. How satisfied with the computer-based material are you?
   ( ) Completely dissatisfied  ( ) Not satisfied at all  ( ) Satisfied  ( ) Very satisfied  ( ) Completely satisfied

3. Does this course meet your expectations (ambitions, desires, requirements, needs)?
   ( ) If yes, why: ________________________________________________
   ( ) If no, why: ________________________________________________

4. Taking this distance education course as an example, do you think it increases your ability to learn?
   ( ) If yes, why: ________________________________________________
   ( ) If no, why: ________________________________________________

5. Would you prefer taking this course by 'traditional education' or 'distance education'?
   ( ) If 'Traditional education', why: ________________________________
   ( ) If 'Distance education', why: ________________________________

6. Have you had any problems using distance learning in this course? ( ) Yes ( ) No
   If yes, please explain: __________________________________________

7. In which sense has your role as a learner changed compared to the traditional way of learning?
   ________________________________________________________________

8. In your opinion, what are the positive aspects of taking a Distance Learning course?
   ________________________________________________________________

8.1. What benefits do you get from learning at a distance?
   ________________________________________________________________

9. Do you have any further comments or issues that should be addressed?
   ________________________________________________________________

Thank you for your co-operation!

Tel P. Hruska
PhD Research Student
Department of Human Sciences
Loughborough, Leics, LE11 3TU
E-mail: T.P.Hruska@lebo.ac.uk

Note: All data and answers will not be passed on and will be kept strictly confidential.
Winter 1998/1999
### APPENDIX A-III: Summary of Results (Case Study A)

#### Table A: Summary of the results regarding the learners’ overall reaction to the CBM

<table>
<thead>
<tr>
<th>General aspects of the CBM</th>
<th>Criteria</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Overall reactions to the CBM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rating A: &quot;terrible&quot; = 1 to &quot;wonderful&quot; = 5</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>2. Rating B: &quot;frustrating&quot; = 1 to &quot;satisfying&quot; = 5</td>
<td>2.43</td>
<td></td>
</tr>
<tr>
<td>3. Rating C: &quot;dull&quot; = 1 to &quot;stimulating&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>4. Rating D: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td>5. Rating E: &quot;rigid&quot; = 1 to &quot;flexible&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td><strong>2. Screen</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Characters on the computer screen: &quot;hard to read&quot; = 1 to &quot;easy to read&quot; = 5</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>7. Character shapes (fonts): &quot;barely legible&quot; = 1 to &quot;very legible&quot; = 5</td>
<td>4.14</td>
<td></td>
</tr>
<tr>
<td>8. Screen layout was helpful: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>9. Amount of information displayed on screen: &quot;inadequate&quot; = 1 to &quot;adequate&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>10. Arrangement of information displayed on screen: &quot;illogical&quot; = 1 to &quot;logical&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>11. Flow of screens: &quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>12. Next screen: &quot;unpredictable&quot; = 1 to &quot;predictable&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>13. Going back to the previous screen: &quot;impossible&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>14. Progression of work related tasks: &quot;confusing&quot; = 1 to &quot;clearly marked&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td><strong>3. Terminology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Use of terminology throughout the system: &quot;inconsistent&quot; = 1 to &quot;consistent&quot; = 5</td>
<td>2.71</td>
<td></td>
</tr>
<tr>
<td>16. Work related terminology: &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>17. Computer related terminology: &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>18. Messages on screen: &quot;ambiguous&quot; = 1 to &quot;precise&quot; = 5</td>
<td>2.57</td>
<td></td>
</tr>
<tr>
<td>19. Instruction: &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>20. Computer keeps you informed about what it is doing: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.43</td>
<td></td>
</tr>
<tr>
<td>21. Performing an operation leads to a predictable result: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>22. Feedback messages: &quot;unhelpful&quot; = 1 to &quot;helpful&quot; = 5</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>23. Error messages, rating A: &quot;unhelpful&quot; = 1 to &quot;helpful&quot; = 5</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>24. Error messages, rating B: &quot;unpleasant&quot; = 1 to &quot;pleasant&quot; = 5</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td><strong>4. Learning to operate the system</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td>26. Getting started: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>2.86</td>
<td></td>
</tr>
<tr>
<td>27. Tasks can be performed in a straightforward manner: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>28. Number of steps per task: &quot;too many&quot; = 1 to &quot;just right&quot; = 5</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>29. Steps to complete a task follow a logical sequence: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>30. Feedback on the completion of a sequence of steps: &quot;unclear&quot; = 1 to &quot;clear&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td><strong>5. Installation/Downloading</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. Rating: &quot;difficult&quot; = 1 to &quot;easy&quot; = 5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>32. Speed of downloading: &quot;slow&quot; = 1 to &quot;fast&quot; = 5</td>
<td>2.33</td>
<td></td>
</tr>
<tr>
<td>33. Downloading only the module you want: &quot;confusing&quot; = 1 to &quot;clear&quot; = 5</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>34. Informs you the file size for downloading: &quot;never&quot; = 1 to &quot;always&quot; = 5</td>
<td>4.00</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B-I: Lecturers' Survey Form (Case Study B)

We want to hear from you! Let us know what you think of this training and how we can improve it. All personal data and answers are strictly confidential and tutors will not be identified in the survey report.

SECTION I: Personal Data

1. First name: ____________________________ 2. Middle name: ____________________________ 3. Surname: ____________________________

4. Telephone #: ____________________________ 5. E-mail: ____________________________ 6. Fax #: ____________________________

7. Department: ____________________________

8. Age group: ( ) 20-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 61 +

9. Gender: ( ) Female ( ) Male

10. How long have you been teaching at a distance via videoconferencing?

( ) 6 months - 2 years ( ) 2-5 years ( ) 5-10 years ( ) 10+ years

11. What subject matter(s) have you been teaching at a distance via videoconferencing?

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

SECTION II: Usability

1. Is the current course your first distance teaching via videoconferencing experience?

( ) Yes ( ) No

2. If not, when was your first distance teaching via videoconferencing experience?

( ) Month ( ) Year

3. What is the main method of contact with students?

( ) E-mail ( ) Telephone ( ) Fax

( ) Videoconferencing ( ) Audioconferencing ( ) Others, please specify: ____________________________

4. What are the main problems with this method of contact?

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________
5. Please circle the numbers which most appropriately reflect your impressions about using videoconferencing. Note that NA = Not Applicable.

Setting up for conference__________________________Difficult 1 2 3 4 Easy 5 NA
Time to establish the video connections to others__________________________Tea long 1 2 3 4 Just right 5 NA
Number of connections possible__________________________Too few 1 2 3 4 Enough 5 NA
Arrangement of windows showing connecting groups__________________________Confusing 1 2 3 4 Clear 5 NA
Window with view of your own group is of appropriate size__________________________Never 1 2 3 4 Always 5 NA
Window(s) with view of connecting group(s) is of prop. size__________________________Never 1 2 3 4 Always 5 NA
Determining the focus of attention during conference was__________________________Confusing 1 2 3 4 Clear 5 NA
Video image flow__________________________Choppy 1 2 3 4 Smooth 5 NA
Focus of video image__________________________Fuzzy 1 2 3 4 Clear 5 NA
Audio output__________________________Impossible 1 2 3 4 Audible 5 NA
Audio is in synchrony with video images__________________________Never 1 2 3 4 Always 5 NA
Exchanging data__________________________Difficult 1 2 3 4 Easy 5 NA
Transmitting files__________________________Difficult 1 2 3 4 Easy 5 NA
Retrieving files__________________________Difficult 1 2 3 4 Easy 5 NA
Using on-line chat__________________________Difficult 1 2 3 4 Easy 5 NA
Using shared workspace__________________________Difficult 1 2 3 4 Easy 5 NA
Learning to operate the system__________________________Difficult 1 2 3 4 Easy 5 NA
Getting started__________________________Difficult 1 2 3 4 Easy 5 NA

6. Do you have enough technical support? ( ) Yes ( ) No
Sometimes

7. Please explain:

8. When teaching at a distance via videoconferencing, do you face any problem with:

Please fill in the spaces between the brackets with numbers from (1) to (5). You can repeat the same number.

(1) Too problematic (2) Very problematic (3) Problematic (4) Somewhat problematic (5) No problem at all

a. Workstation:

b. Environment:

c. Organization:

SECTION III: Acceptability

1. How satisfied with distance teaching are you?

Disatisfied Satisfied
1 2 3 4 5 NA

Please explain:

2. How satisfied with the videoconferenced way of teaching are you?

Disatisfied Satisfied
1 2 3 4 5 NA

Please explain:

3. Has the distance teaching via videoconferencing met your expectations (ambitions, desires, requirements, needs)? ( ) Yes ( ) No

4. Please explain:

5. Do you think distance teaching via videoconferencing has been a good way of teaching? ( ) Yes ( ) No

6. Please explain:

7. Would you prefer teaching this course by 'traditional education' or 'distance education'? ( ) By 'traditional education' ( ) By 'distance education'

8. Please explain:
9. It is known that the role of the students and tutors changes with distance education. While students have to be more independent, have to have more control of the learning process and have to be more disciplined, tutors have less control of the teaching process, therefore they play the role of a supportive tutor and supervisor. Could you tell me in which sense has your role as a tutor changed due to distance teaching via videoconferencing? Please, list any such new roles of the tutor regarding to distance teaching via videoconferencing:


10. It is known that there are several positive aspects, benefits and advantages of distance teaching via videoconferencing. From a tutor’s perspective, what are these positive aspects, benefits and advantages?


11. Do you see the videoconference classroom as:

☐ An alternative to the usual classrooms
☐ A substitute for main classrooms
☐ An attempt to simulate normal classrooms

12. Do you see the distance education as:

☐ An alternative to traditional education
☐ A substitute for traditional education
☐ An attempt to simulate traditional education

13. Please rate the effectiveness of videoconferencing as experienced. Circle the appropriate number.

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Ineffective</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars: student participation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Seminars: discussion</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Consultation with student: one-to-one</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Group work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

14. What are the students requirements for taking a distance learning course via videoconferencing?


15. What are your requirements for teaching at a distance via videoconferencing?


16. On average how long do you spend on the preparation of the course (i.e. teaching material, conferences)?


17. On average how long did you spend on learning to operate the videoconference equipment?


18. How motivated are the students?

<table>
<thead>
<tr>
<th>Completely unmotivated</th>
<th>Very motivated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

19. If the learners are not motivated, could you tell me the reason(s)?


20. Do you think distance education and computer-based materials can support the teaching process for all types of subject matter or they are only adequate for certain kinds of subject matter?


21. How often do you contact your students (face-to-face meeting)?

☐ Never
☐ Three times a month
☐ Three times in a semester
☐ Once a week
☐ Twice a month
☐ Once per month
☐ Twice in a semester
☐ Once in a semester

22. Has this experience, teaching at a distance via videoconferencing, met your expectations (ambitions, desires, requirements, needs)?


23. What are the main reasons for students to take a distance learning course?


24. What are the main causes of drop out by students?


25. Would you teach another distance learning course by videoconferencing again?

☐ Yes
☐ No

26. Please explain:


27. Would you make any specific recommendation about its use?


28. Do you have any further comments or issues that should be addressed?

________________________________________________________________________

Thank you for your co-operation! Your help is appreciated!

Tel P. Hiratsuka
PhD Research Student
Loughborough University
Department of Human Sciences
Loughborough, Leic, LE11 3TU
E-mail: T.P.Hiratsuka@boro.ac.uk

Note: All data and answers will not be passed on and will be kept strictly confidential.

Spring 1999

APPENDIX B-II: Students Survey Form (Case Study B)

We want to hear from you! Let us know what you think of this distance learning course via videoconferencing and how we can improve it. All personal data and answers are strictly confidential and learners will not be identified in the survey report. Please, use UPPERCASE. All spaces should be completed. Please, do not forget to provide your explanations. They are extremely important. Thank you very much for your co-operation!

SECTION I: Personal Data (OPTIONAL)

1. First name:_________________2. Middle name:_________________3. Surname:_________________

4. Telephone #:_________________5. E-mail:_________________6. Fax #:_________________

7. Department:_________________8. Course:_________________

SECTION II: General Data

1. Age group: ( )20-30 ( )31-40 ( )41-50 ( )51 +

2. Gender ( )Female ( )Male

3. Are you studying for a degree? If yes, which one?
   ( ) Baccalaureate ( ) Master ( ) PhD ( ) Other? Specify:_________________

4.a ( ) Part-time student or ( ) Full-time student

4.b. If you are part time, are you working? ( ) Yes ( ) No

4.c. If you are working which is your occupation?
   ( ) Managerial ( ) Clerical ( ) Manual labour (physical work)
   ( ) Academic ( ) Sales ( ) Research and development
   ( ) Medical ( ) Legal ( ) Governmental
   Specify:_________________

5. How long have you been taking distance learning course via videoconferencing?
   ( ) 0.5 - 5 years ( ) 5 - 10 years ( ) 10 + years

6. Why have you decided to take this distance learning course via videoconferencing?

________________________________________________________________________

7. What were your expectations (ambitions, desires, requirements, needs) before taking this course at a distance via videoconferencing?

________________________________________________________________________

________________________________________________________________________

8. Ethnic background: ( ) White/Anglos ( ) Hispanic/Latinos ( ) Asian
   ( ) Middle Eastern/Persians ( ) Black/African

9. Is English your first language? ( ) Yes ( ) No
SECTION III: Usability

1. Is the current course your first distance learning experience? ( ) Yes ( ) No

2. If not, when was your first distance learning experience? ( ) Month (19____) Year.

3. How often do you use the following in your study?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>(1) do not use at all</th>
<th>(2) every three months</th>
<th>(3) once per month</th>
<th>(4) twice per month</th>
<th>(5) every week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face meetings with your tutor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face meetings with your colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Royal mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Express mail (fast delivery)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail (file transfer and messaging)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fax</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voice-mail (Answer machine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chat room on the Web</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Real time, text-based computer communication)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audioconferencing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Videoconferencing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. What are the methods of contact with tutors? Choose the appropriate options and explain the problems with each of them:

   a. Methods:
   b. If any problems, please explain:

   ( ) Email__________________________________________
   ________________________________

   ( ) Videoconferencing
   ________________________________

   ( ) Telephone
   ________________________________

   ( ) WebBoard____________________________________
   ________________________________

   ( ) Audioconferencing______________________________
   ________________________________

   ( ) Fax__________________________________________
   ________________________________

   ( ) Face-to-face meetings__________________________
   ________________________________

   ( ) Others:
   ________________________________

5. Please circle the numbers which most appropriately reflect your impressions about using videoconferencing. Note that NA = Not Applicable.

   Setting up for conference_________________________ ( ) Difficult ( ) Easy

   Time to establish the video connections to others_________________________ ( ) Too long ( ) Just right

   Number of connections possible_________________________ ( ) Too few ( ) Enough

   Arrangement of windows showing connecting groups_________________________ ( ) Confusing ( ) Clear

   Window with view of your own group is of appropriate size____________________ ( ) Never ( ) Always

   Window(s) with view of connecting group(s) is of appropriate size________________ ( ) Never ( ) Always

   Determining the focus of attention during conference was____________________ ( ) Confusing ( ) Clear

   Video image flow____________________________________ ( ) Choppy ( ) Smooth

   Focus of video image__________________________________ ( ) Fuzzy ( ) Clear

   Audio output_______________________________________ ( ) Inaudible ( ) Audible

   Audio is in sync. with video images____________________ ( ) Never ( ) Always

   Exchanging data____________________________________ ( ) Difficult ( ) Easy

   Transmitting files___________________________________ ( ) Difficult ( ) Easy

   Retrieving files____________________________________ ( ) Difficult ( ) Easy

   Using on-line chat__________________________________ ( ) Difficult ( ) Easy

   Using shared workspace______________________________ ( ) Difficult ( ) Easy

   Learning to operate the system:________________________ ( ) Difficult ( ) Easy

   Getting started____________________________________ ( ) Difficult ( ) Easy

6. Do you have enough learning support from tutors?
   ( ) Yes ( ) No ( ) Sometimes

6. Please give your reason(s):
   ____________________________________________________________
7.a Do you have enough technical support? ( ) Yes ( ) No ( ) Sometimes
7.b Please, give your reason(s)?

8. When taking distance learning classes via videoconferencing, do you face any problem with:
Please, fill in the spaces between the brackets with numbers from (1) to (5). You can repeat the same number.
(1) Too problematic (2) Very problematic (3) Problematic (4) Somewhat problematic (5) No problem at all

(a) Workstation:
- Lack of appropriate furniture (e.g., desk)
- Inappropriate dimensions of the furniture
- Uncomfortable chair
- Lack of footrest
- Tools located in places of difficult access
- Inappropriate position of cameras and monitors
- Poor video quality
- Poor audio quality (i.e., overlapping voices)
- Lack of tea machine
- Inappropriate seating arrangement

(b) Environment:
- Illumination
- Temperature
- Noise
- General layout
- Location

(c) Organization:
- Content of the subject matter
- Structure of the course
- Teaching material
- Communication
- Timing and synchronisation

SECTION IV: Acceptability

1.a How satisfied with the videoconferenced way of learning are you?

<table>
<thead>
<tr>
<th>Unsatisfied</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
</tr>
</tbody>
</table>
1.b Please, explain:

2.a Has this course at a distance via videoconferencing met your expectations (ambitions, desires, requirements, needs)? ( ) Yes ( ) No

3.b Please, explain:

4.a Do you think distance learning via videoconferencing has been a good way of learning? ( ) Yes ( ) No

4.b Please, explain:

5.a Would you prefer taking this course by traditional education (TE), distance education (DE), or a combination of both, dual mode of delivery (DUAL)?

( ) TE ( ) DE ( ) DUAL
5.b Please, explain:

6. It is known that the role of the student changes compared to the traditional way of learning. Please rate all of the following options according to levels of importance:
a. I have to be more independent and to have self-control
b. I have to be more self-disciplined
c. I have to work twice as hard
d. Others, please specify:

7.a Do you see distance education as:
- An alternative to traditional education
- A substitute for traditional education
- An attempt to simulate traditional education
- Others, please specify:

7.b Do you see the videoconferencing classroom as:
- An alternative to the usual classroom
- A substitute for main classrooms
- An attempt to simulate normal classrooms
- Others, please specify:

8. With regard to your current experience, please rate all of the following options with the most appropriate number from (1) to (5):
a. Lack of teaching support
b. Lack of face-to-face meetings with faculty and class mates
c. Lack of supportive atmosphere of traditional lecture rooms
d. Lack of technical support
e. Lack of socialization, therefore isolation
f. Not being able to know whether I am doing well or badly
g. I have to be more independent and to have self-control
h. I have to be more self-disciplined
i. I have to work twice as hard
j. Being uncomfortable in front of the camera
k. Inhibition of freedom of expression

<table>
<thead>
<tr>
<th>Very important</th>
<th>Not important at all</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
1. Lack of confidence with the videoconferencing technology 1 2 3 4 5 NA

2. Videoconferencing equipment can be distracting 1 2 3 4 5 NA

3. Lack of motivation 1 2 3 4 5 NA

4. Others, please specify: ___________________________ 1 2 3 4 5 NA

9. Please rate the effectiveness of learning at a distance via videoconferencing as experienced. Circle the appropriate number.

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Ineffective</th>
<th>Very effective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td>NA</td>
</tr>
<tr>
<td>Student participation</td>
<td>1 2 3 4 5</td>
<td>NA</td>
</tr>
<tr>
<td>Discussion</td>
<td>1 2 3 4 5</td>
<td>NA</td>
</tr>
<tr>
<td>Consultation with tutor: one-to-one</td>
<td>1 2 3 4 5</td>
<td>NA</td>
</tr>
<tr>
<td>Group work</td>
<td>1 2 3 4 5</td>
<td>NA</td>
</tr>
</tbody>
</table>

10.a Would you take another distance learning course by videoconferencing again? ( ) Yes ( ) No

10.b Please, explain: ________________________________________________________________

11. Would you make any specific recommendation about its use? ________________________________________________________________

12. Do you have any further comments or issues that should be addressed for the next distance learning via videoconferencing course? ________________________________________________________________

Thank you for your co-operation! We appreciate the time you spent on this survey!

Tel: P. Hirstuza
PhD Research Student
Loughborough University
Department of Human Sciences
Loughborough, Leics, LE11 3TU, UK
E-mail: T.P.Hirstuza@lboro.ac.uk

Individual data will be kept confidential, but some aggregate findings may be reported.
Spring 1999
APPENDIX B-III: Statistical Treatment (Case Study B)

a) The first attempt was to perform the test including all the respondents of the sample A (n=31)

Table B-1: Ranks

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Experience</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00 (sample A)</td>
<td>31</td>
<td>19.05</td>
<td>501.60</td>
</tr>
<tr>
<td></td>
<td>2.00 (sample B)</td>
<td>5</td>
<td>15.10</td>
<td>75.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table B-2: Results

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
<th>Exact Sig. (2-tailed Sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>88.500</td>
<td>75.500</td>
<td>-8.13</td>
<td>.416</td>
<td>.448</td>
</tr>
</tbody>
</table>

The result indicates that there is no significant difference between the level of satisfaction between the more experienced students (sample B) and the less experienced students (sample A). However, this result is only an indication that cannot be taken as a final conclusive statement since the relatively small sample size (sample B) reduces the power of the test. As an attempt to make the two sample sizes comparable, five students from sample A (31) were randomly selected using SPSS so that a second test could be performed.

b) The second attempt was to randomly choose five subjects from sample A so that they would be the same size (n=5)

Table B-3: Ranks

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Experience</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00 (sample A)</td>
<td>5</td>
<td>6.40</td>
<td>32.00</td>
</tr>
<tr>
<td></td>
<td>2.00 (sample B)</td>
<td>5</td>
<td>4.60</td>
<td>23.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table B-4: Results

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
<th>Exact Sig. (2-tailed Sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.600</td>
<td>23.000</td>
<td>-8.86</td>
<td>.324</td>
<td>.421</td>
</tr>
</tbody>
</table>

The Mann-Whitney test still confirms that there is not enough evidence that satisfaction would rise according to the level of experience as one might expect (i.e. results from previous study).
APPENDIX C-I: Faculty Survey Form (Case Study C)

We want to hear from you! Let us know what you think of this course at a distance via Internet and how we can improve it. All personal data and answers are strictly confidential and faculty will not be identified in the survey report. Please, if possible, use UPPERCASE.

SECTION I: Personal Data (OPTIONAL)
4. Telephone #: __________________________ 5. E-mail: ___________________________ 6. Fax #: __________________________
7. Department: __________________________

SECTION II: General Data
1. Age group: ( ) 20-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 61 +
2. Gender: ( ) Female ( ) Male
3. How long have you been teaching at a distance via Internet?
   ( ) 0-2 years ( ) 2-5 years ( ) 5-10 years
   ( ) 10+ years ( ) Others: __________________________
4. What subject matter(s) have you been teaching at a distance via Internet?

5. What were your expectations from teaching at a distance via Internet (ambitions, desires, requirements, needs) before beginning teaching at a distance?

6. Why have you decided to teach at a distance via Internet?

SECTION III: Usability
1. If you are teaching now, is the current course your first distance teaching via Internet experience?
   ( ) Yes ( ) No
2. If not, when was your first distance teaching via Internet experience?
   ( ) Month (19___) Year
3. What are the methods of contact with students? Choose the appropriate options and explain the problem with each of them:
   a. Methods: __________________________
      b. If any problems, please explain:
         ( ) Email

4a. Do you have enough technical support? ( ) Yes ( ) No ( ) Sometimes
4b. Please explain:

5. Please rate the effectiveness of distance teaching via Internet as experienced. Choose the appropriate number.
   a. Lectures
      | Ineffective | 1 | 2 | 3 | 4 | 5 | NA |
   b. Student's participation
      | Ineffective | 1 | 2 | 3 | 4 | 5 | NA |
   c. Discussion
      | Ineffective | 1 | 2 | 3 | 4 | 5 | NA |
   d. Consultation with student: one-to-one
      | Ineffective | 1 | 2 | 3 | 4 | 5 | NA |
   e. Group work
      | Ineffective | 1 | 2 | 3 | 4 | 5 | NA |
6. If you are not responsible for the preparation of the teaching material published on the Web, please choose the numbers which most appropriately reflect your impressions about this material. Note that NA = Not Applicable.

<table>
<thead>
<tr>
<th></th>
<th>Terrible</th>
<th>Wonderful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>d</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>e</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

7. How often did you use the following in your course?

<table>
<thead>
<tr>
<th></th>
<th>Do not use - NA</th>
<th>(1) Once per semester</th>
<th>(2) Every two months</th>
<th>(3) Once per month</th>
<th>(4) Twice per month</th>
<th>(5) Every week</th>
<th>(6) Every three days</th>
<th>(7) Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face meetings with students</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Face-to-face meetings with your colleagues</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>US Post Office</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Express mail (fast delivery)</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>E-mail (file transfer and messaging)</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Fax</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Voice-mail (Answer machine)</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Telephone</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Pager</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Printer</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Chat room on the Web</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>(Text-based, text-based computer communication)</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>WebBoard</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Videoconferencing/Audioconferencing</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>

8. How often do you see your students (face-to-face meeting)?

- [ ] Never
- [ ] Once per semester
- [ ] Twice per semester
- [ ] Other:

SECTION IV: Acceptability

1.a. How satisfied with distance teaching via Internet are you?

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfied</th>
<th>Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

1.b. Please explain:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

2.a. Has the distance teaching via Internet met your expectations (ambitions, desires, requirements, needs)?

- [ ] Yes
- [ ] No

2.b. Please explain:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

3. What are your requirements for teaching at a distance via Internet (any informal training)?

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

4.a. If you teach the same course by 'traditional education' (TE), 'distance education' (DE), and a combination of both, dual mode delivery (DUAL), which way do you prefer?

- [ ] TE
- [ ] DE
- [ ] DUAL

4.b. Please explain:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

5. The role of the students and faculty members changes with distance education. Could you tell me in which sense has your role as a faculty member changed due to distance teaching via Internet? Please, list any such new roles of the faculty regarding distance teaching via Internet:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

6. There are several positive aspects, benefits and advantages of distance teaching via Internet. From faculty's perspective, what are these positive aspects, benefits and advantages?

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
7. Do you see the distance education as:
( ) An alternative to traditional education
( ) A substitute for traditional education
( ) An attempt to simulate traditional education
( ) Other: 

8.a. Do you think distance teaching via Internet has been a good way of teaching?
( ) Yes  ( ) No

8.b. Please explain:  

9.a. On average, how long do you spend on the preparation of the course content (i.e. teaching material, videoconferences)?

9.b. On average how long did you spend on learning to operate the technical equipment for distance teaching?

10.a. How motivated are the students?  Completely unmotivated  Very motivated

1  2  3  4  5  NA

10.b. If the students are not motivated, could you tell me the reason(s)?

11. Do you think distance education and computer-based materials can support the teaching process for all types of subject matter or they are only adequate for certain kinds of subject matter?

12. What are the main reasons for students to take a distance learning course?

13. What are the main causes of drop out by students?

14.a. Would you prefer not to teach another distance learning course by Internet?
( ) Yes  ( ) No

14.b. Please explain:

15. Would you make any specific recommendation about its use?

16. Do you have any further comments or issues that should be addressed the next time you teach at a distance?

Thank you for your co-operation! We appreciate the time you spent on this survey!

Tel P. Hiratsuka
PhD Research Student
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Department of Human Sciences
Loughborough, Leics, LE11 3TU, UK
E-mail: P.Hiratsuka@lboro.ac.uk

Individual data will be kept confidential, but some aggregate findings may be reported.
Summer 1999
APPENDIX C-II: Students Survey Form (Case Study C)

We want to hear from you! Let us know what you think of this distance learning course via Internet and how we can improve it. All personal data and answers are strictly confidential and students will not be identified in the survey report. Please, if possible, use UPPERCASE.

SECTION I: Personal Data (OPTIONAL)
1. First name:_________________  2. Middle name:___________  3. Surname:_________________
4. Telephone #:_________________  5. E-mail:__________________  6. Fax #:__________________
7. Department :_________________  8. Course:_________________

SECTION II: General Data
1. Age group: ( ) 20-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 61 +
2. Gender: ( ) Female ( ) Male
3. What is the highest degree you have completed?
   ( ) High School  ( ) Baccalaureate  ( ) Master  ( ) Doctorate  ( ) J.D.
4.a. ( ) Part-time student  ( ) Full-time student
4.b. If you are part-time, are you working? ( ) Yes ( ) No
4.c. If you are working which is your occupation?
   ( ) Administrative  ( ) Clerical  ( ) Manual labour (physical work)  ( ) Services
   ( ) Academic  ( ) Sales  ( ) Research and development  ( ) Other, please specify:________
   ( ) Medical  ( ) Legal  ( ) Governmental
5. How long have you been taking distance learning course via Internet?
   ( ) 0.5-2 years  ( ) 2.5-5 years  ( ) 5-10 years  ( ) 10+ years  ( ) Others:________
6. Do you have computer at home? ( ) Yes ( ) No
7.a. If yes, do you have Internet connection at home? ( ) Yes ( ) No
7.b. If not, where do you have access to computer with Internet connection?
   ( ) At work  ( ) University Lab  ( ) Others, please specify:________
8. Do you have a printer available? ( ) Yes ( ) No
9. What were your expectations (ambitions, desires, requirements, needs) before taking a course at a distance? PLEASE EXPLAIN:

   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

10. Why have you decided to take this distance learning course via Internet?

   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

11. Ethnic background:
   ( ) White/Anglos  ( ) Hispanic/Latinos  ( ) Asian
   ( ) Middle Eastern/Persians  ( ) African American  ( ) African
12. Is English your first language? ( ) Yes ( ) No

SECTION III: Usability
1. Was the Fall semester your first distance learning experience? ( ) Yes ( ) No
2. If not, when was your first distance learning experience? ( ) Month (19_____) Year
3. How long have you been using a computer?
   ( ) For less than 1 year  ( ) For less than 3 years  ( ) For 3-5 years
   ( ) For 5-7 years  ( ) For 7-9 years  ( ) For more than 9 years
4. How long have you been using Internet?
   ( ) For less than 1 year  ( ) For less than 3 years  ( ) For 3-5 years
   ( ) For 5-7 years  ( ) For 7-9 years  ( ) For more than 9 years
5. Have you had IT (Information Technology) training before? If yes, when?

6. How often did you use the following in your course?
   (0) Do not use - NA  (1) Once per semester  (2) Every two months  (3) Every other month
   (4) Twice per month  (5) Every week  (6) Every three days  (7) Nearly every day

   Fill in the spaces with the appropriate number as listed above:
   Face-to-face meetings with faculty ( )
   Face-to-face meetings with your colleagues ( )
   US Post Office ( )
   Express mail (last delivery) ( )
   E-mail (file transfer and messaging) ( )
   Fax ( )
   Voice-mail (Answer machine) ( )
   Telephone ( )
   Pager ( )
   Printer ( )
   Chat room on the Web ( )
   (Real time, text-based computer communication)
   WebBoard ( )
   Videoconferencing/Audioconferencing ( )
7. Do you prefer reading on the screen or printing documents out? Choose just one answer.
( ) I prefer reading on the screen when the document is no longer than 1 page.
( ) I prefer reading on the screen when the document is no longer than 2 pages.
( ) I prefer reading on the screen when the document is no longer than 3 pages.
( ) I prefer printing the document out whenever it contains important information or it is very interesting.
( ) I scan through (to have a quick look) the document because the printer is located in another room so that it is not easily accessible.
( ) I scan through (to have a quick look) and save the document to be read afterwards because I do not have a printer available.

8. What are the methods of contact with faculty? Choose the appropriate options and explain the problem with each of them:
   a. Methods:
   ( ) Email
   ( ) Chat on the Web
   ( ) Telephone
   ( ) WebBoard
   ( ) Real Audio
   ( ) Others:

   b. If any problems, please explain:

9. On average, how much time do you spend per week for each course connected to the Web?
   ( ) Less than one hour 
   ( ) One to less than four hours
   ( ) Four to less than ten hours
   ( ) Over ten hours
   ( ) Others:

10. Please circle the numbers which most appropriately reflect your impressions about the course content on the Web. Note that NA = Not Applicable.
   a. Terrible Wonderful
      1  2  3  4  5  NA
   b. Frustrating Satisfying
      1  2  3  4  5  NA
   c. Dull Stimulating
      1  2  3  4  5  NA
   d. Difficult Easy
      1  2  3  4  5  NA
   e. Prolif Phobia
      1  2  3  4  5  NA

11.a. Do you have enough learning support from faculty? ( ) Yes ( ) No ( ) Sometimes

11.b. Please explain:

12.a. Do you have enough technical support? ( ) Yes ( ) No ( ) Sometimes

12.b. Please explain:

SECTION IV: Acceptability

1.a. How satisfied with the distance learning via Internet course are you?
    Described           Satisfied
    1  2  3  4  5  NA

1.b. Please explain:

2.a. Has the distance learning via Internet course met your expectations (ambitions, desires, requirements, needs)? ( ) Yes ( ) No

2.b. Please explain:

3.a. Do you think distance learning via Internet has been a good way of learning? ( ) Yes ( ) No

3.b. Please explain:

4.a. If you had access, would you prefer taking a course with the same faculty and curriculum by traditional education (TE), distance education (DE) or a combination of both, dual mode delivery (DUAL)?
    ( ) TE ( ) DE ( ) DUAL

4.b. Please explain:
5. It is known that the role of the student changes compared to the traditional way of learning. Please rate all of the following options according to levels of importance:

<table>
<thead>
<tr>
<th>Options</th>
<th>Very Important</th>
<th>Not so important</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I have to be more independent and to have self-control</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. I have to be more self-disciplined</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. I have to work twice as hard</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Others, please specify: ____________________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

6. Do you see the distance education as:

- An alternative to traditional education ( )
- A substitute for traditional education ( )
- An attempt to simulate traditional education ( )
- Others, please specify: ____________________________________________

7. With regard to your current experience, please rate all of the following options with the most appropriate number from (1) to (5):

<table>
<thead>
<tr>
<th>Options</th>
<th>Very Important</th>
<th>Not so important</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of teaching support</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of face-to-face meetings with faculty and class mates</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of supportive atmosphere of conventional lecture rooms</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of technical support</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of socialization, therefore isolation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Not being able to know whether I am doing well or badly</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of freedom of expression</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of confidence with the technology</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Navigating on the Web can be time consuming and distracting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Problems related to the connection with the server (i.e. due to traffic, download, low speed...)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Others, please specify: _____________________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

8. It is known that there are several positive aspects, advantages and benefits of taking a distance learning course via Internet. With regard to your current experience, please rate all of the following options according to levels of importance:

<table>
<thead>
<tr>
<th>Options</th>
<th>Very Important</th>
<th>Not so important</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Flexibility</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. Being able to learn at my own pace</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. Not having to travel from home to the campus locations</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Being able to learn at my own convenient time</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. Being able to learn at my own convenient location (i.e. home, work)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f. Not having to spend time and money on transport from home to the campus locations</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g. Others, please specify: ____________________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

9. Please rate the effectiveness of the Internet based course as experienced. Circle the appropriate number.

<table>
<thead>
<tr>
<th>Options</th>
<th>Very ineffective</th>
<th>Very effective</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Lectures</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. Student participation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. Discussion</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Consultation with faculty; one-to-one</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. Group work</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

10.a. Would you take another distance learning course by Internet again? ( )Yes ( )No

10.b. Please explain: ____________________________________________________

11. Would you make any specific recommendation about its use?

__________________________________________________________

12. Do you have any further comments or issues that should be addressed for the next distance learning course?

__________________________________________________________

Thank you for your co-operation! We appreciate the time you spent on this survey!

Yours faithfully

P.K. Hiratuka
PhD Research Student
Leeds Metropolitan University
Department of Human Sciences
Loughborough, Lincs, LE11 2TU, UK
E-mail: T.P.Hiratuka@lms.ac.uk

Individual data will be kept confidential, but some aggregate findings may be reported.

Summer 1999
APPENDIX D-I: Managers Interview Protocol (Case Study D)

- Question 1:
  Could you tell me about your DE programme?

- Question 2:
  What will be taught at a distance?

- Question 3:
  What are the goals, if already defined, of your DE programme?

- Question 3.a:
  Why?

- Question 4:
  What are you making decisions about?

- Question 5:
  Who is the target population?

- Question 6:
  Where is your DE programme planning in the development process?

- Question 7:
  What are your responsibilities in the DE programme development process?

- Question 8:
  What kinds of issues have you considered?

- Question 9:
  Why are these issues important?

- Question 10:
  How are these issues being addressed?

- Question 11:
  What resources do you need?

- Question 12:
  What resources have you got?
APPENDIX D-II: Managers’ Questionnaire (Case study D)

Please, circle the number that best indicates the importance level of the following items for your Distance Education Programme:

<table>
<thead>
<tr>
<th>Characteristics:</th>
<th>Your comments please:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Gender</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Marital status</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Number of children (if any)</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>English level (for non-native speakers)</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Full-time/Part-time</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Working/Not working</td>
<td>Not important=1 → Very important=5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Background:</th>
<th>Your comments please:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Economic</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Educational</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Cultural</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Familiarity with IT/Internet</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Previous experience with DE</td>
<td>Not important=1 → Very important=5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Individual needs:</th>
<th>Your comments please:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambitions:</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Expectations:</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Interests:</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Main site of instruction: (e.g. work, home, others)</td>
<td>Not important=1 → Very important=5</td>
</tr>
</tbody>
</table>

2. Access to infrastructure

Please, circle the number that best indicates the importance level of the following items for your Distance Education Programme:

<table>
<thead>
<tr>
<th>Services:</th>
<th>Your comments please:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Administration</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Academic/Research staff</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>English support (for non-native speakers)</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>Counselling</td>
<td>Not important=1 → Very important=5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources:</th>
<th>Your comments please:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>Not important=1 → Very important=5</td>
</tr>
<tr>
<td>On-line library</td>
<td>Not important=1 → Very important=5</td>
</tr>
</tbody>
</table>

(e.g. on-line database for literature survey, on-line journals, on-line database for thesis abstracts, on-line orders, on-line delivery and on-line reservation of full-text documents)
### 3. Choosing the appropriate technology

Please, circle the number that best indicates the importance level, regarding your Distance Education Programme, for choosing the appropriate technology for the following items:

<table>
<thead>
<tr>
<th>Category</th>
<th>Not important</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Groups</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Class</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Instruction:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Discussion</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Tutorial</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Group Work</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Delivery:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Students' assignments</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Support:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Academic</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Administrative</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Social</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>English for non-native speakers</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Evaluation:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students' progress assessment</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Quality of instruction assessment</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lecturer's teaching assessment</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>DE Programme effectiveness</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

*Your comments please:* ____________________________________________________________________________________________

### 4. Allocation of staff members’ roles and responsibilities

Please, circle the number that best indicates the importance level, regarding your Distance Education Programme, for allocating staff members’ roles and responsibilities for the following items:

<table>
<thead>
<tr>
<th>Role</th>
<th>Not important</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Administrative support:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical support:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Free) phone for immediate support</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Site facilitator for computer conferencing/Videoconferencing or other synchronous Sessions</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Support via e-mail</td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Academic support:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>English support for non-native speakers:</strong></td>
<td>Not important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Counselling support:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Your comments please:* ____________________________________________________________________________________________
### 5. Face-to-face meeting(s) between lecturers and students

Please, circle the number that best indicates the importance level, regarding your Distance Education Programme, of face-to-face meeting(s) between lecturers and students for the following items:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Importance Level</th>
<th>Your comments please</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inducting sessions at the start of the course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introducing the technology</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Providing social interaction</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Introducing lecturers and staff</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Introducing basic concepts of DE:</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Setting procedures for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivering handouts to students</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Delivering assignments to lecturers</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Assessing students' work</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Making expectations clear:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the lecturer</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>From the technicians</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>From the students</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Introducing local library(ies)</td>
<td>Not Important</td>
<td></td>
</tr>
<tr>
<td>Introducing local laboratory(ies)</td>
<td>Not Important</td>
<td></td>
</tr>
</tbody>
</table>

Has this questionnaire helped you to think about issues that you had not considered before?

Please explain:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Thank you for your co-operation!
## APPENDIX E: Tabulated Data of Information about the Students (Case Study D)

**Table E-1: Information about the students**

<table>
<thead>
<tr>
<th>Information about the students</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2.71</td>
</tr>
<tr>
<td>Gender</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.57</td>
</tr>
<tr>
<td>Marital status</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1.71</td>
</tr>
<tr>
<td>Number of children (if any)</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2.86</td>
</tr>
<tr>
<td>English level for non-native speakers</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3.71</td>
</tr>
<tr>
<td>Full-time/Part-time</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Working/Not working</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>4.14</td>
</tr>
<tr>
<td><strong>Background:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Economic</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>2.57</td>
</tr>
<tr>
<td>Educational</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Cultural</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2.57</td>
</tr>
<tr>
<td>Familiarity with IT/Internet</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>3.57</td>
</tr>
<tr>
<td>Previous experience with DE</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2.71</td>
</tr>
<tr>
<td>Individual needs</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Ambitions</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4.14</td>
</tr>
<tr>
<td>Expectations</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>4.14</td>
</tr>
<tr>
<td>Interests</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4.14</td>
</tr>
<tr>
<td>Main site of instruction</td>
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<td>1</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3.71</td>
</tr>
</tbody>
</table>
APPENDIX E: Tabulated Data of Access to Infrastructure (Case Study D)

Table E-2: Access to infrastructure

<table>
<thead>
<tr>
<th>Access to infrastructure</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4.57</td>
</tr>
<tr>
<td>Laboratory</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>3.86</td>
</tr>
<tr>
<td>Administration</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.43</td>
</tr>
<tr>
<td>Academic/Research staff</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.86</td>
</tr>
<tr>
<td>English support</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3.86</td>
</tr>
<tr>
<td>counselling</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3.71</td>
</tr>
<tr>
<td>Resources:</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
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<td>4</td>
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<td>2</td>
<td>5</td>
<td>4.43</td>
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</tbody>
</table>
APPENDIX E: Tabulated Data about the Choice of Appropriate Technology (Case Study D)

Table E-3: Choice of appropriate technology

<table>
<thead>
<tr>
<th></th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>4</td>
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APPENDIX E: Tabulated Data about the Allocation of Staff Members (Case Study D)

Table E-4: Allocation of staff members’ roles and responsibilities

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APPENDIX E: Tabulated Data about Face-to-face Meetings (Case Study D)

Table E-5: Face-to-face meeting(s) between lecturers and students

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